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ART. XXVIII.—CALISAYA BARK.

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(With a Wood-Cut.)

In the last number of the Journal, a general account was published of the labors of Dr. Weddell, in South America. He has been, as there stated, eminently successful in clearing up many doubtful points connected with the subject of Quinology. From the extent and importance of his memoir, he has taken rank in scientific discovery with Ruiz and Pavon, Mutis, De La Condamine, &c. From the same work, on the present occasion, we shall extract the account of the source of Calisaya bark, the discovery of which alone, would have immortalized his name.

Cinchona Calisaya.

C. foliis oblongis, vel lanceolato-obovatis, obtusis, basi attenuatis, rarius utrinque acutis, glabratiss, nitidis vel subtus pubescentibus, in axillis venarum scrobiculatis, filamentis quam dimidia anthera plerumque brevioribus; capsula ovata; flores longitudine vix æquante; seminibus margine crebre fimbriato denticulatis.

a. *Calisaya vera*, arbor, foliis oblongo-vel lanceolato-obovatis, obtusis.

β. Josephiana, frutex, foliis oblongo-vel ovato lanceolatis, acutiusculis.

Cinchona Calisaya, Wedd. Ann. Sc. Nat. x. 6.

Hab. Bolivia et Peruvia australis (v. v.)



CALISAYA VERA.—A tall tree, with a naked trunk, either straight or bent in its ascent, not infrequently exceeding

twice the thickness of the human body. The head is leafy, mostly elevated above the other trees of the woods.

Bark of the trunk thick. The periderm thicker than in almost all the species of the genus, easily separated from the liber, and when torn off, disclosing marks or impressions corresponding with those of the exterior, as the bark is marked by parallel vertical clefts, or transverse fissures more or less annular. It is whitish, or may be black. The periderm of the branches is whitened, or diversely marbled with the fronds of lichens; it is marked with clefts more sinuate, and fissures which are narrower, some of them are annular and distant, while others are shorter and nearer to each other. Finally, upon the branches, the bark is thin, smooth, and brownish-olive, or blackish.

The leaves are lanceolate-obovate, about 8 to 15 centimetres (3 to 5 inches, nearly) long, and 3 to 6 cm. (1 to 2 inches) broad; they are acute at base, gently attenuate, soft, flat, very glabrous above, beautified with a velvety gloss connected with the prominent cells of the epidermis, and pale green; the veins being pale and little conspicuous; on the under surface they are light emerald green, smooth and scrobiculated in the axils of the veins; the depressions are scarcely perceptible on the upper surface. The *petiole* is 1 cm. (nearly $\frac{1}{2}$ inch) long, green, more rarely rubescent, as is the rib. Upon the young tree, the leaves are often a little more acute, of a more lively green, very velvety, the rib and petiole roseate, the nerves above being milk white, and the limb very often beset with roseo-sanguineous spots, the lower part of the pagina being more or less purpurescent.

Stipules oblong, obtuse, longer than or sub-equal to the petioles, very glabrous, sparingly beset on the inner base with glands.

Flowering panicle ovate, or sub-corymbose, scarcely multiflowered, peduncles and pedicles (2 to 4 millimetres) ($\frac{2}{3}$ to $1\frac{1}{4}$ inches) long, pubescent. Bracts lanceolate.

Calyx pubescent, limb crateriform, teeth short, triangular.

Corolla 9 to 10 mm. ($\frac{1}{2}$ inch) long, tube cylindrical, or at base subpentagonal and slightly contracted, sometimes cleft in the angles, flesh colored, with lanceolate teeth, above rose colored, with white marginal villi. Stamina hidden in the middle of the tube: filaments smooth, half as long as the anthers. *Style* almost as long as the tube, lobes of the stigma linear, subexserted, virescent.

Fruit bearing panicle somewhat loose, not unfrequently very bare, peduncles puberulent.

Capsule ovate, 10 to 15 mm. ($\frac{1}{2}$ to $\frac{3}{4}$ inch) long, the length scarcely double its width, rotund at base, ribbed, smooth, rubiginous at maturity; teeth of the crown short, somewhat erect.

Seeds, elliptico-lanceolate; denticulate, margin fimbriated, teeth approximated, a little obtuse; the nucleus about equal to the third part of the seed.

Habitat.—In the declivities and rugged portions of the mountains, at an altitude of 1500 to 1800 m., and in the woods of the hottest vallies of Bolivia and southern Peru, between 13° and 16° 30' S. L., and 68° and 72° West Long. in the provinces of Bolivia, called Enquisivi, Yungas, Larecacha and Caupolican, and in the Peruvian province Carabaya. It flowers in April and May.

The bark is commonly called indiscriminately by the Spaniards and Indians *Cascarilla Colisaya*, *Calisaya* or *Culisaya*.

The varieties consist in the bark and leaves being more delicate, in the panicle being sub-diffused, and in the flowers being smaller, (vulg. *Calisaya blanca*.)

β. *Josephiana*.* A shrub, 2 to 3 m. (6 to 9 ft.) high. *Trunk* graceful, 3 to 5 cm. (1 to 1½ in.) thick and branched, branches erect. *Bark* closely adhering to the wood, on the trunk and branches shistous, black, somewhat smooth, or beset with diverse lichens, having some narrow distant clefts, annularly marked; that of the branches brownish red.

* *Kinakina humilis* with oblong leaves, red on the nerves, larger flower, resembling that of *Menianthidis*; the bark still bitter.

Leaves oblong or ovate lanceolate, each subacute, or a little obtuse, slightly rigid; the upper, especially, more or less concave, boat-shaped, glabrous, or on the under side pubescent tomentose, prettily green, both nerves and petioles sanguineous. The *panicle*, both flower and fruit bearing, interrupted. *Corolla* a little longer than in the preceding variety. *Stamina* at the bottom of the tube, filaments either short as in the *Calisaya vera*, the style at the same time being longer, or the anthers being long are subexserted, the style is shorter and surmounted by them. The *capsule*, as in the type, somewhat longer than the flower, and not unfrequently more or less attenuated above, towards maturity, beautifully rubescent as well as the branches of the panicle. Teeth of the crown a little elongated and beautifully patent.

It more frequently occurs in mountain meadows of the same regions than the preceding, and, I may say, is the sole kind peculiarly an ornament to them.

It is to this species that we owe the most important of the barks employed therapeutically, known as *Calisaya*, the origin of which has hitherto been unknown.

The etymology of the term *Calisaya* is obscure. Humboldt thought that it came from the province from which the bark was principally derived, but persons well informed with respect to the country, informed me that no such province existed. In the department of La Paz, moreover, it was found abundantly, and frequently went by the name of *Colisaya*, or of *Calisaya*, and I am disposed to believe that these designations have been applied to it in consequence of the red color assumed on drying the external surface of the denuded bark, or of that which the leaves sometimes have. *Colli*, signifies in effect *red* in the Quichua language; and *saya*, taken figuratively, means *sort* or *form*. The red maize is called *Colliscara* or *Culli*.

I have stated that this tree, so far, has not been met with in Peru, except in the southern part of the province of *Cara-baya*; the results at which I have arrived, in searching to

determine with exactness the limits of the region, are of sufficient interest to be noticed here.* Thus after having studied it in the whole ancient province of Yungas de la Paz, to the north of 17° of S. L., I followed it in that of Larecaya or Sorata, then in that of Caupolican or Apolobamba, the place of its first discovery. But having arrived in Peru, I saw it suddenly cease upon the confines of the valley of Sandia; and in spite of all the care I took, I could not find it to the north of these points. There was there a fictitious barrier which the plant did not pass, although in appearance, the neighboring valleys were of the same nature; a fact which can hardly be explained, except upon the supposition that the more southern valleys of the province of Carabaya were different from the northern ones, in consequence of the peculiar distribution of the rivers. I believe, indeed, that I may state that those of the district indicated, belong to a particular group, dependent on the Bolivian conformation, and that those of the remainder of the province diverged on the contrary by the north from Peru, into the upper Amazon. This inexplicable attachment which certain plants exhibit for regions natural to them, and especially for valleys, is not without example; and now that geographical botany has attracted serious attention, science will be more enriched by analogous facts. The great repute of Calisaya bark has caused it to be so sought for, that it is becoming scarce, and there is no doubt but that some day it will completely disappear from commerce, and we shall be forced to be satisfied with some of the species now rejected. Already around inhabited places, it is not seen but as a shrub, and if by chance some small tree remains

* There exists between the Bolivians and Peruvians, a sort of rivalry upon the subject of this production. The rumor having spread, in fact, that *Cinchona calisaya* was not produced except in the Bolivian territory, the barks collected in Peru, no matter how good, are constantly valued at a lower price, of which the Peruvians, with reason, complain.

unnoticed in the forest, no sooner does its trunk elevate itself, but the hatchet attacks it. When, for my satisfaction, I desired to see this species in all its vigor, it was necessary for me to make long journeys afoot into the forests; to traverse them by paths scarcely opened, and to undergo some of the fatigues which constitute the common lot of the Cascarilleros.

The curious variety which I have described under the name of *Cinchona Josephiana*, to commemorate the name, too little known, of Joseph de Jussieu, is called by the inhabitants of the country *Ichu Cascarilla*, or *Cascarilla del Pajonal*, denominations which signify both "Cinchona of the Meadows," (*ichu* in the Quichua language, and *paja*, in Spanish, signify *herb*.) I, for a long time, thought that this variety ought to constitute a distinct species, but further study made in the localities, has proved to me that it is only a particular form of the type to which I have referred it. I have even little doubt at present that the districts it occupies were formerly covered with forests, and that when these were destroyed, doubtless from the effects of fire, the plant in reproducing itself assumed this stunted growth, similar in this respect to many plants in Brazil, which take such different proportions in the *campos* and in the forests. It is probable, from this, that the culture of the cinchona will not succeed, except so far as the conditions are applied to it which will enable it to expand itself. It is especially necessary, it would seem, that it should have the company of other trees, which, by increasing a little more rapidly than it, afford a protecting shade during the early years of its existence.* It has more than once happened to me, upon the mountains of Tepoani, for example, in passing from a pajonal or meadow, to open woods, and from thence

* The soil in which the *C. calisaya* generally grows, is similar to that called *fresh earth* (virgin earth.) It is true, considerable quantities of Humus are formed upon the surface, but they are, in a measure, removed by the rains, which wash the slopes of the mountains, during many months of the year.

to a dense forest, to observe the diverse modifications which the form and the appearance of the *Ichu Cascarilla* undergo. The color and texture of its different parts, especially, undergo the most notable change, according to the degree of exposure in which it grows. In one place the leaves are coriaceous and matted with strongly colored nerves, and with stiff petioles; in another the leaves are soft, and of the velvety green peculiar to calisaya, the petioles being flabby. Finally, when the head of the adult plant peers above the neighboring trees, its organs resume some of the characters which it possesses in the state of *Ichu Cascarilla*.

The characters by which the presence of *C. calisaya* is recognised in the midst of the forest are very variable, and many of them require that species of instinctive skill which is found only among the people who have observed them all their lives. There is not a practised *Cascarillero* who does not pretend to be able to distinguish the top of one of these trees at the distance of a kilometre, by the movement of its leaves and the peculiar reflection which results from it; this recognition is easier still, if the tree be in flower or fruit, the color of which are characteristic. In the forest, the trunk is recognised at first sight by the appearance of the peridermis, sometimes of a grayish white, at others brown or black, but constantly marked by clefts or fissures, longitudinal and approximated, connected by others which are transverse; a character which is not observed in any other tree of these forests, with the exception of one or two of its congeners, and, to a certain degree, the *Vichullo*,* with which it is sometimes confounded. This appearance is frequently, however, concealed by mosses and other parasites, which cover more or less the greater portion of the trunk, and then the oldest *Cascarillos* may be deceived. I was told that a collector of cinchona bark had had his own tent placed against the large trunk of

*A new species of the genus *Laplacea*, (*Ternstræmiaceæ*), the *L. quinoderma*; see Weddell, p. 9—33.

a cinchona calisaya tree for a long time without knowing it, until a more skilful person recognised it and appropriated the spoil.

At the moment of the separation of the periderm, both of the surfaces exposed have a yellow color like the fresh peel of the walnut, soon becoming brown like the shell of the same.

The odor is then like that of elder bark, but less decided. The taste is strongly bitter; with hardly an admixture of astringency, but at the same time somewhat sharp; this bitterness is perceived at the first touch of the tongue.

From the external surface of the bark, especially when it has been contused, there flows a yellow gum resinous matter, sometimes a little lactaceous, bitter and styptic, to which the cutters attribute all the virtues of cinchona. This matter is the same as that which fills all the cells of the dermis, and which flows from breaks in the young bark. It has appeared to me, however, contrary to the opinion of the Cascarilleros that it was much less bitter than the juice of the inner face of the bark. It stains the clothes dull red, and its presence more or less influences the color of the bark in drying. The Cascarilleros are of opinion that the abundance of *milk*, as it is called, greater as it is in the *C. calisaya*, retards its desiccation. It is by the effect of bruising that the juice is spread over the surface of the separated bark; the contused points are then seen of a wine color, which is deeper the more they are exposed to the solar rays. I have sometimes seen the Cascarilleros irritate the entire surface with a hard brush to make it assume this shade.

The consistence of this bark, when removed from the tree, is slight; it then breaks any way with the greatest facility. A good idea of this is conveyed by comparing it to the fleshy portion of a mushroom. The Cascarilleros highly value this character, which is more decided where the bark is best. In the inferior qualities, and in the false cinchonas more especially, where the union of the cortical

fibres is more apparent, the bark breaks transversely with greater difficulty.

Dr. Weddell has given descriptions of the two varieties of Calisaya bark, in all respects according with those in the modern works on Pharmacology. Guibourt in his description has been very precise on this point, and has been closely followed. The two are *quills* and *flat* pieces. These constitute the variety called in Bolivia *Colisaya amarilla*, *C. dorada* or *C. anaranjada*. "Another, remarkable for the deep shade of its external face, which sometimes is entirely of a wine black, goes by the name of *Colisaya zamba*, *C. negra* or *C. macha*. I have especially noticed it at Apolobamba in Bolivia, and in the province of Carabaya in Peru."

A third variety, finally, with the surface less unequal, sometimes semicellulose and of a pale color, has merited the appellation of *Colisaya blanca*.

The bark of the *Cinchona Josephiana* or *Ichu Cascarilla* of the Peruvians is rare in commerce, although in indigenous medicine as much used as the other, in consequence of the facility of procuring it. "Its peridermis is brown, or of a blackish gray, or slate color, (a color which, I may remark in passing, appears to me to be common to all the barks of the cinchonas developed under the influence of the air and sun,) upon which are beautifully formed the pale lichens covering it. As this bark is very adherent to the wood, it is but imperfectly detached, and its internal surface is often torn."

I have seen in Peru a sort of cinchona furnished by this same *Ichu Cascarilla*, not from the trunk or branches, but from the large roots, or rather the stump; and it is not improbable that this kind will one day or other be of great importance, in spite of difficulties in procuring it, for not only does it present a mine which so far has been hardly worked, but it would appear to furnish a product superior to much of the bark which engages attention at the pre-

sent day. This bark is in short pieces, flat, undulated, or more or less contorted, destitute of periderm, with a fibrous, even, shining internal surface, slightly cellular externally, of a uniform, ochreous, yellow color, of marked bitterness, but less powerful than in good calisaya, of which additionally it exhibits the internal structural characters.

The increasing scarcity of the calisaya bark has induced the collectors to mix the bark of other kinds with it, and this fraud is more difficult of detection, from becoming habituated to it, or at least from the want of skill required to detect it. The admixture is practised with the bark of the *C. Boliviana* and *C. ovata* var. *rufinervis*, or more rarely, and upon the coast, solely with that of *C. Scrobiculata*; in other words, with the barks which M. Guibourt calls *Calisayas légers du commerce*. With the *C. scrobiculata* it cannot be a long time confounded—but nothing is more easy than with the two first—so that in Bolivia the *Cinchona Boliviana* is also called calisaya, a designation which moreover its properties have well merited. The best characters to distinguish the true calisaya from all other species are—the shortness of the fibres of the entire transverse fracture, and the ease with which they are broken, instead of bending and remaining adherent, as observed in the bark derived from the *rufinervis* and *scrobiculata*. Finally, its uniform yellow color and not white marbling in its thickness, distinguish it from the *C. Boliviana*. The density (which causes the nail to leave a shining mark when drawn over its internal surface forcibly) and the conchoidal form of the outer surface, still further serve to distinguish the calisaya. It is more difficult to discriminate between the quills of the different varieties—the greater thickness of the epiderms and size of the resinous circle, together with the bitterness, will serve, in some measure, to distinguish it.

An idea of the consumption of this bark can be given by the fact that the Bolivian Company export annually, exclusive of sophistication, more than 4000 quintals, or

200,000 killogrammes. It will be difficult for the forests to sustain for a long time so great a demand. The amount furnished by a single tree varies much. A good size tree affords 6 or 7 arobes* after the bark is dried.

ART. XXIX.—PHARMACEUTICAL NOTICES.

By WILLIAM PROCTER, JR.

Fluid Extract of Sarsaparilla.—It has been frequently objected, in the use of the Compound Syrup of Sarsaparilla, that the large amount of sugar present soon cloyes the patient and creates disgust for the medicine. In view of this, as well as to give a concentrated preparation more manageable than the syrup, the fluid extract, originally suggested by William Hodgson, Jr., (Vol. II. p. 285 of this Journal,) was proposed, and has gradually found its way into extensive use. There are some patients who even object to the saccharine portion of this last mentioned preparation, and I have been called on to prepare it without the sugar.

By reference to the investigations that have been made respecting the active principle of sarsaparilla, it will be found that that substance is but sparingly soluble in water *per se*, and that this fluid is not well fitted, at any temperature at which it may be applied, as an extracting menstruum. Further, it will be seen, when a hydro-alcoholic solution of sarsaparilla is evaporated to a small bulk, so as to remove *all* the alcohol and a part of the water, that there is a tendency in the sarsaparillin to separate by crystallization, by long standing.

Now, in view of these facts, as well as to render this preparation less obnoxious to change by fermentation, it is suggested to replace the whole or a part of the sugar, by alcohol, in such a manner that the alcohol shall not be in

*The arobe equals $11\frac{1}{2}$ killogrammes.

greater ratio than it exists in weak wine. As this is not yet an officinal preparation, I will suggest the propriety of making an addition to its ingredients, founded on an experience of many years, by those who have employed the modified preparation; these are chimaphila and dulcamara, each in the ratio of one part to four of the sarsaparilla. The following is the formula, with the above proposed changes, viz.:

Take of Sarsaparilla, *ground*, sixteen ounces, (troy.)

Bitter sweet and Pipsissewa, in coarse powder,
of each four ounces.

Liquorice root and Guaiacum wood, in coarse
powder, of each two ounces.

Sugar, four ounces.

Alcohol, two fluid ounces.

Diluted alcohol, seven pints.

Water, a sufficient quantity.

Oil of wintergreen and oil of sassafras, of each
four minims.

Mix the solid ingredients—pour over them in a suitable vessel five pints of diluted alcohol—allow them to macerate for one week, and remove the whole to a displacement apparatus, in such a manner that the fluid shall not pass too rapidly. Return the tincture several times, then displace the absorbed portion first with the remaining two pints of diluted alcohol, and afterwards with water, very gradually added, until eight pints of fluid have passed. Recover the alcohol by distillation to one-half, then by means of a water bath evaporate the residue to twelve fluid ounces, and add the sugar, and the two fluid ounces of alcohol in which the volatile oils have been dissolved; let the mixture stand with occasional agitation for four hours, and strain.

It will be perceived that the mezereum has been omitted. The reasons for this are, that it gives an unpleasant acrimony to the preparation, masks the taste of the sarsaparilla, and does not possess any decided virtues in the opinion of

many practitioners. The dose of this preparation is a teaspoonful taken in any convenient vehicle.

Fluid Extract of Rhubarb.—It has been objected to the formula for this preparation, published in Vol. 19, p. 182 of this Journal, that owing to the large proportion of matter extracted, the addition of eight ounces of sugar gives too thick a consistence to the fluid extract, rendering it inconvenient for dispensing and administering in cold weather. The writer has not found this objection so forcible as some others have, but he will propose the following modification of the published formula, which he believes will overcome the objections stated, at the same time that the rhubarb strength of the preparation will not be interfered with. It consists in substituting one fluid ounce of tincture of ginger for two ounces of the sugar, thus:

Take of Rhubarb, eight ounces, (troy.)

Sugar in powder, two ounces.

Diluted alcohol, two pints.

Tincture of ginger, one fluid ounce.

Reduce the rhubarb to coarse powder, mix it with its bulk of sand, moisten with diluted alcohol, and after the drug has become swollen by maceration for an hour, remove it to a suitable displacer, and add diluted alcohol slowly until two pints of tincture have passed. Evaporate this in a water bath to six fluid ounces, add the sugar and finally the tincture of ginger.

The increased proportion of ginger will supersede the necessity of adding the volatile oils. If tincture of ginger is objected to, alcohol will accomplish the end equally well.

Wine of Tar, Tar Beer.—A formula for this preparation was published in the 14th volume of this Journal, (p. 281,) by the late Augustine Duhamel, in which a quart of bran, a pint of tar, half a pint of honey and three quarts of water, are mixed together in an earthen pipkin, allowed

to simmer over a slow fire for three hours, then suffered to cool, half a pint of yeast added, and after it has stood thirty-six hours strained for use.

If these directions are followed to the letter, the product is exceedingly unsatisfactory, will not keep well, and is impregnated with but a small amount of the medicinal virtues of the tar. The addition of the tar at the first part of the process is the chief objection to this formula, for the following reason. It is well known that creasote and other empyreumatic substances will suspend the process of fermentation, when added during its progress, and prevent it from occurring if added with the ferment. Now there is more than enough of this substance in the tar to prevent the action of the yeast almost entirely; hence the product when finished consists of the soluble matter of bran, honey and water, impregnated with so much of the soluble portion of tar as will be taken up under the circumstances in which it is placed, being in fact but little stronger than tar water. The office of the bran is to disintegrate the tar so that the water may act on a largely exposed surface. Ground malt answers this mechanical purpose equally well, and as it is acted on by ferment when placed in water, this is an additional reason why it should be preferred to the bran.

When, therefore, malt is substituted for bran, and the mixture of malt, honey, water and yeast, is suffered to react for thirty-six hours before adding the tar, so much alcohol is generated that it enables the fluid to dissolve a much larger proportion of that substance, and to keep perfectly well. The following is the proposed formula, viz.:

Take of Ground Malt, Honey and Tar, of each one pound.

Yeast, of each, half a pint.

Water, a sufficient quantity.

Mix the malt, honey and three quarts of the water in an earthen vessel, keep them at the temperature of 150° F., (about,) with occasional stirring for three hours, then suffer the whole to cool to about 80° F. and add the yeast. Fer-

mentation soon sets in, and should be promoted by maintaining the temperature between 70° and 80° F., during thirty-six hours. The supernatant fluid should then be decanted from the dregs of the malt, and the tar added gradually to these, in a small stream, stirring constantly, so as to distribute it uniformly among them and prevent its conglomerating in masses. The decanted fluid is then returned to the vessel, and the whole well stirred up from time to time for several days or a week, observing to add water occasionally to keep the original measure. The whole is then thrown on a piece of canton flannel, or other close strainer, the fluid allowed to pass, and the dregs expressed strongly, to remove as much as possible of the fluid enclosed. The expressed liquid is then filtered for use: there is an advantage in allowing it to stand, until it gets nearly clear by subsidence, before filtering it.

When first made, before filtering, wine of tar has but little color, but soon acquires a reddish-brown hue by exposure. It smells and tastes strongly of tar, is slightly acid, is not unpleasant to most persons, and when prepared as above, is undoubtedly a valuable auxiliary to the physician in pulmonary diseases.

Solution of Citrate of Magnesia.—As this preparation has found favor with physicians and the public, and as it is of some importance to be able to prepare it speedily and without much complication, the following recipe is offered as more practicable than that noticed at Vol. XX, p. 254 of this Journal. The formula is for six bottles, and by multiplying the quantities, any desirable amount may be prepared; but as the solution has a strong tendency to deposit basic citrate of magnesia, the number mentioned will be sufficient for most retail establishments at one time.

First prepare six twelve ounce bottles, and fit to them corks of the best quality.

Take of Citric acid, six ounces.

Carbonate of magnesia, four ounces.

Lemon syrup, twelve fluid ounces.

Water, a sufficient quantity.

Dissolve the citric acid in two pints of the water, previously heated; add to it three ounces and a half of the carbonate, and as soon as it is dissolved, strain or filter the solution as the case may demand; distribute it equally between the six bottles, and add to each two fluid ounces of lemon syrup. The remaining half ounce of carbonate is then triturated smoothly with sufficient water to make six fluid ounces, and a fluid ounce of the mixture added to each bottle, which should then be filled with water, immediately corked, and tied over securely. In the course of half an hour, with occasional agitation, the carbonate will be dissolved, and the eliminated carbonic acid retained by the solution, if the corks prove good.

ART. XXX.—ON HYDRARGYRUM CUM CRETA CHANGED
BY OXIDATION.

BY WILLIAM PROCTER, JR.

Within a few years past a number of instances have been noticed in this city, and I believe in Baltimore also, where the administration of this mercurial preparation has produced unlooked for effects, not at all attributable to its acknowledged constituents. My attention was called to this fact more especially by observing a change in the appearance of a specimen of the preparation in my possession, and which I had carefully prepared by the formula of Dr. David Stewart of Baltimore, as modified by the late Peter Lehman, (*Amer. Journ. Pharm.* vol. 16, page 9,) from pure materials. In this specimen which is about 18 months old, the lower undisturbed portion of the powder, immediately

in contact with the glass, had the proper bluish color, characteristic of the preparation, whilst the upper disturbed portion, and indeed the whole mass excepting the part alluded to had a light reddish tinge, such as would be produced by incorporating a small portion of burnt umber with white lead. The idea at once occurred that some unknown circumstances had caused the per oxidation of the mercury, and should this be true, the inordinate effects of the preparation noticed above, would be satisfactorily accounted for. That this supposition was correct let the following investigation witness, viz.

1st. One hundred grains of the specimen of mercury with chalk was placed in a vial, an excess of aqueous hydrocyanic acid added, and the mixture shaken occasionally for ten hours. The whole was then thrown on a filter, the undissolved portion lixiviated and the clear filtrate evaporated in a capsule, until evidences of crystallization were manifest around the edges of the liquid, when the vessel was set aside. In half an hour the mother liquid was decanted from a mass of brilliant acicular crystals, weighing, with that contained in the mother liquid, subsequently isolated, more than 26 grains. These crystals were colorless, had a strong metallic taste like corrosive sublimate, and when dissolved in dilute muriatic acid the odor of hydrocyanic acid was observable. Several grains of these crystals were placed in a sealed tube, the open end drawn out to a fine open point and the closed end containing the saline matter heated to redness, whilst a lighted taper was held at the orifice. Soon a jet of purple flame was seen issuing from the tube, whilst the interior surface of the tube beyond the heated end was coated with globules of mercury, thus completing the chain of evidence that the crystalline matter is bicianuret of mercury, which could only have been formed by deutoxide of mercury in the hydrarg. cum creta.

2. Sixty grains of the cretaceous mercurial powder was boiled in distilled water acidulated with muriatic acid until

all the matter soluble in that menstruum was removed, when the whole was thrown on a weighed filter and the insoluble residue washed with distilled water and dried. The presence of bichloride of mercury in the colorless filtered solution was indicated by its affording a black precipitate with hydrosulphuret of ammonia, a yellow precipitate with solution of potassa, a scarlet precipitate with iodide of potassium soluble in an excess of the precipitant, and a white precipitate with ammonia. The whole of the liquid was precipitated with the latter reagent and the precipitate when washed and dried, weighed 16 grains, representing 17.02 grains of corrosive sublimate in the solution, or 13.68 grains of red oxide in the hydrarg. cum creta experimented on.

The insoluble residue left by the dilute hydrochloric acid weighed 11.5 grains. It had a bluish gray color without exhibiting any globules of free mercury. This was boiled in solution of potassa, which instantly changed its color to black. This liquid filtered off from the black powder was saturated with nitric acid and a slight excess of nitrate of silver added, which produced a white precipitate soluble in ammonia. This was collected on a weighed filter, washed, dried, and weighed, amounting to 1.75 grains, representing .431 grain of chlorine, or 2.9 grains of calomel which was produced from 2.526 grains of black oxide of mercury existing in the mercurial powder analysed. The black powder resulting in the last experiment was treated with acetic acid until the black oxide of mercury was removed, and the filter washed and dried. The residue of metallic mercury partially revived, weighed 6.50 grains.

It follows from these results that the specimen of "mercury with chalk" examined, contains of

| | <i>per cent.</i> | <i>equal to</i> |
|-----------------------|------------------|-----------------|
| Deutoxide of Mercury, | 22.80 | 21.25 of metal |
| Protoxide of Mercury, | 4.21 | 4.05 " |
| Metallic Mercury, | 10.83 | 10.83 " |
| | | <hr/> 36.13 |

Theoretically, the powder should have contained 37.5 per cent of mercury. The deficit of 1.37 per cent must be attributed to loss in the preparation of the powder originally, and inaccuracy in the analysis.

It is a matter of speculation what should have caused this change in the preparation. The powder was prepared by triturating 6 drachms of resin (colophony) and 3 oz. of mercury, together with sufficient alcohol added from time to time to keep the mixture of a pasty consistence, until the mercury was extinguished properly. Five ounces of prepared chalk was then gradually added, (the consistence being kept pasty) until the whole was thoroughly mixed. The resin was then removed by washing with alcohol—allowing the powder to subside, and decanting, several times renewed and finally lixiviated on a filter with the same fluid until the alcohol that passed ceased to communicate opalescence to water. Can the resinous acid (colopholic acid) of the rosin possess the property of inducing oxidation? and does this agent, by enabling the operator to push the division of the mercury to a very high degree, rendering the powder extremely porous, so extend its surface as to give it a tendency to absorb and concentrate oxygen from the air in its interstices, as is the case with platina sponge, and iron by hydrogen? In the several preparations in which mercury exists in a minute state of division, various suggestions have been made with a view of saving labor, especially in making mercurial ointment. These suggestions are of two kinds—those which act chemically and those whose influence may be considered mechanical. Sulphur, oil of egg, and balsam of sulphur belong to the first class; and when used their action is due to the formation of an exceedingly minute coating of sulphuret of mercury on the surface of the globules, which when divided are thereby prevented from coalescing. Rancid fatty matter, and resins, both of which possess this power of facilitating the extinguishment of mercury in an eminent degree, I have heretofore looked upon

as acting mechanically by their ability to cling to or stain the bright surfaces of the globules of mercury, and thus prevent their coalescence when once divided. Now, on reflection, I am inclined to believe that these substances may act by slightly oxidizing as well as staining the minute particles of mercury, and commence a process which is subsequently carried on by the oxygen of the air. In the case of *blue mass*, the sugar is well known to act as a preventive of oxidation, and hence that preparation ought to be less liable to change by atmospheric exposure than the others. Whatever may be the cause of this extraordinary change, the above results lead us to reject the use of resin, as in the process of Stewart, or any other labor-saving agent having the same tendency, and I think it may be worthy of investigation, whether a mixture of pure chalk and mercury, in which the latter is in a state of extreme division, will not gradually absorb oxygen and have its properties changed. The ordinary glass stoppered bottles, such as the specimen analysed was kept in, will not exclude the air, and if they did the frequent opening in the process of dispensing will afford abundant opportunity for the production of this change, if it really will occur unassisted by any foreign substance.

ART. XXXI.—REMARKS ON SOME OF THE PHARMACEUTICAL PREPARATIONS.

BY JOSEPH LAIDLEY.

(Extracted from an Inaugural Essay.)

Glycerin Ointment as a substitute for Ceratum Cetacei.
Spermaceti cerate having a proneness to become rancid, and unfit for the objects of its employment, and being too stiff, Mr. Laidley proposes the following ointment as a substitute, viz: Take of

White Wax and Spermaceti, each one ounce and a half.

Lard, five ounces.

Glycerin, one fluid ounce.

Melt together the wax and spermaceti, add the lard, and as soon as the whole is liquified, remove the mixture from the source of heat; stir constantly until when on cooling they begin to thicken, add the glycerin and incorporate it thoroughly with the other ingredients.

Samples of the above ointment were tried by two of our most respectable physicians, who gave it a decided preference over the officinal simple cerate. They thought it much more efficacious, milder, of a better consistence, and altogether better adapted to the purposes for which simple cerate is used, than that cerate.

With regard to the glycerin, its healing properties are too well known to need comment; but it should be stated that it acts also as a preservative agent, for an ointment, made as above, except that oil of almonds was used instead of lard, was sweet after having been kept at a moderate temperature during seven months.

Rose Water Ointment. This ointment, popularly known as *Cold Cream*, is a very nice looking article, and when freshly prepared, is undoubtedly a very good one; but it does not keep well; the consistence being soft, and the rose

water renders it rancid, and is liable to separate from the grease.

I would recommend the following formula as affording an ointment which is not liable to such changes if properly prepared, viz :

| | |
|------------------------------|---------------------|
| Take of Oil of Sweet Almonds | two fluid ounces, |
| Spermaceti, | six drachms, |
| Glycerin, (sp. gr. 1.15,) | four fluid drachms, |
| Oil of Roses, | two drops. |
| Oil of Bergamot, | " |

The spermaceti is melted with the aid of a gentle heat. The oil is next stirred in so gradually as not to recongeal any of the spermaceti. The mixture is then removed from the fire and stirred constantly until on cooling it begins to thicken, when the glycerin is thoroughly incorporated. Lastly, add the oil, and mix them.

This ointment, intended as a substitute for cold cream, was originally prepared for some friends, who liked it so much, that after more than two years' use among them, I furnished samples of it to some of our physicians, who preferred it to the Ung. Aqua Rosæ for irritated chapped surfaces. If made with good materials, it will keep for several months, even when subjected to the exposure that ointments usually have in the shop. The glycerin does not ordinarily separate like the rose water.

Nitrate of Mercury or Citrine Ointment. This Ointment, when prepared according to the officinal directions, is a dark brown substance, in consistence usually not much firmer than honey, a fact that has induced many pharmacists to resort to other methods, in hope of obtaining a handsomer article. The consequence of this state of things is that the preparation varies in composition, consistence and appearance ; sometimes containing mercury as proto-nitrate sometimes as per nitrate.

With a view of satisfying myself that an ointment of nitrate of mercury uniform in composition, in color, and in

consistence *could be made* from the ingredients and proportions indicated in the United States Pharmacopœia, a series of experiments were undertaken. As these number about thirty, it is unnecessary to give a detailed account of them; general results only will be stated.

1st. The Pharmacopœial formula, where the ointment is prepared by melting together the lard and neats-foot oil, and when they begin to stiffen on cooling, mixing in the solution of nitrate of mercury, &c., does not produce a fine preparation; its consistence is too soft; its color is a dark brown, and the proper reaction between the fat and the acid does not take place.

2d. Heat is necessary to induce this reaction, and consequently to the formation of a good ointment; but if carried too high, the excessive oxidation of the fatty matter occurs at the expense of the acid of the mercurial salt, separating a portion of this as insoluble sub-nitrate.

3d. A particular limit should therefore be observed in the temperature at the period of adding the mercurial solution, and this temperature is 204° F. The following formula is suggested, viz:

Take of Mercury an ounce (Troy,)

Nitric Acid (sp. gr. 1.5) eleven fluid drachms,

Fresh neat foot oil, nine fluid ounces,

Lard three ounces.

Dissolve the mercury in the acid, allow the solution to stand until all the nitrous fumes shall have escaped, and the solution becomes colorless, (this may be effected by the aid of heat, if it is wished to proceed with the preparation without delay.) The lard and oil are then melted together, and as soon as the temperature rises to 190° F., add the cold solution, and continue the heat till the temperature of 190° F. is again reached, remove the vessel from the water bath for fifteen minutes, taking care to prevent the temperature from rising above this point; then heat again to 204°, and

finally remove it to a cold water bath and stir constantly until when on cooling it begins to thicken.

[The author regrets that this formula is so troublesome, but he conceives the manipulation stated to be quite necessary to the production of a handsome ointment. He is not certain that the entire removal of the deutoxide of nitrogen from the mercurial solution is essential to the process, but inclines to believe that it is. He further states that on the addition of the cold mercurial solution, the temperature falls to 165° F., and that if the heat is continued much above 190° at first, the re-action will be so violent as to cause the ointment to run over the vessel, unless this is very large: the resulting ointment being dark coloured and granular.—ED.]

Pills of Copaiba. This preparation is sometimes difficult to obtain in a "pilular mass." In following the directions of the Pharmacopœia, the mixture of copaiba with one sixteenth of its weight of magnesia, after standing a whole day, remained semi-fluid; it was then stood aside for a month without acquiring a thicker consistence. In order to satisfy myself of the conditions necessary to the success of the operation, a series of experiments was undertaken, the results of a few of which were as follows, viz:

1st. A portion of copaiba of the consistence of syrup, (the same kind as that used above,) was heated till ebullition commenced, when it was removed from the fire, and the magnesia, one sixteenth of its weight, yet warm from recent calcination, was stirred in; after several hours it had become a good deal harder than the first lot, although not of a consistence proper for forming into pills, and at the end of two days its firmness had not increased. It was then re-heated, another portion of freshly calcined magnesia, equal to the first was stirred in, and at the expiration of four hours the mixture had concreted into a good pilular mass.

2d. A portion of very old and thick copaiba was heated till ebullition commenced, when one eighth of its weight of hot recently calcined magnesia was stirred into it. It solid-

ified in three hours. These experiments were repeated with the same results, from which it would seem that for complete success the magnesia should be calcined immediately before using it for this purpose, and the copaiba heated till ebullition commences. To prevent accident from the boiling over of the copaiba, on the addition of the magnesia, the vessel should be removed from the fire.

3d. As these last experiments were made with very old and thick copaiba, in order to satisfy myself whether a fresh article would answer, several varieties of copaiba were treated as in the second experiment, but using only the prescribed quantity of magnesia. They would not solidify until the second addition of magnesia, which caused them to assume a solid consistence in from five to seven hours.

4th. A portion of *Angustura copaiba*, known as "Solidifying Balsam," was heated until ebullition commenced, when one sixteenth [of its weight of freshly prepared and still hot magnesia was added and thoroughly stirred into it. At the expiration of six hours the mixture had acquired a good pilular consistence. On cutting open the mass, I found some of the magnesia uncombined. It should have been stirred occasionally whilst cooling.

From the above experiment I conclude, firstly, that when it can be obtained, *Angustura copaiba* (supposing that its composition, &c., is always the same) should be preferred for this purpose; and secondly, if any other variety than the *Angustura* be employed, one eighth of its weight of magnesia will be necessary to insure solidification.

Dover's Powder, Powder of Ipecacuanha, and Opium. For the preparation of this valuable medicine, the *Pharmacopœia* directs the dry ingredients to be rubbed into a very fine powder. It is generally admitted that the efficacy of this preparation depends in a great measure on the fineness of the powder, and with a view of reducing the opium and ipecacuanha to the finest condition, the sulphate of potassa is introduced; but we seldom meet with *Dover's powder* in

that finely divided condition best calculated to produce its peculiar effects. This arises partly from the length of time necessary, and the amount of labour requisite in the production of a very fine powder; and partly, sometimes, from the disagreeable effects produced on those engaged in its preparation, being such as to induce them to shorten the process of trituration, and of course an inferior powder is obtained.

With a view of remedying these difficulties in its preparation, I have adopted the following manipulation, viz :

Take of Ipecacuanha in powder, a drachm,

Opium in powder, “

Sulphate of Potassa, one ounce

Alcohol (8.35°) a sufficient quantity.

Mix the powders and sulphate of potassa, and when a coarse powder is produced, add sufficient alcohol to form a paste, and then levigate in a large flat mortar until the particles of the pasty mass become impalpable; allow it to become nearly dry, then triturate until quite dry; lastly, sift the powder. By this process the labor is much lessened and although the time intervening between the commencement and the end of the process, may be as long as in the method of the Pharmacopœia, yet the time necessarily occupied with it is not near so much. Alcohol is employed in preference to water on account of its greater volatility and its incapability of *dissolving* the sulphate of potassa.

ART. XXXII.—ON GLYCERIN.

BY SAMUEL E. SHINN.

(An Inaugural Essay.)

Although glycerin has for a considerable time been known to the chemist, its application, either in medicine or pharmacy, has been very limited until quite a recent period. It had indeed been occasionally employed to give softness to pills or ointments, and had also enjoyed some reputation, as an emollient application to the skin. But within a short period, it has attracted much attention, on account of its efficacy in cases where deafness has been caused by the induration of the wax of the ear; and it is an admirable remedy, as it does not thicken by oxidation, but rather absorbs water from the air, and has a tendency to keep the parts to which it is applied, continually moist. This disposition was shown, by placing a drop of glycerin upon a smooth surface, and exposing it to the air; it gradually increased in bulk, its consistence became much thinner, and remained so as long as any observation was made upon it. Glycerin has shared the fluctuations of opinion, incident to all new remedies, but if nothing should be discovered to counteract the good impression it has already created, it will, perhaps, eventually become generally employed, and be recognized and adopted as officinal in our Pharmacopœia.

Glycerin exists in most of the fixed oils and fatty substances, combined with various acids, from which it can be separated by the process of saponification; the acids leave their old combination, to unite with the basic principle, and the glycerin is set at liberty.

The following is the most common method of obtaining it. Lead plaster is made as directed by the U. S. Pharmacopœia. While yet fluid, a quantity of hot water is thrown in, and mixed intimately with the plaster. It is then allowed to separate, and the liquid being drawn off, is

evaporated to the consistence of a thin syrup, and treated with sulphuretted hydrogen, until a precipitate ceases to be thrown down; when it is filtered, boiled, and evaporated by a gentle heat, until it ceases to lose weight. It is generally colored as thus made, and requires to be passed through animal charcoal.

There is some difficulty in obtaining glycerin colorless, unless the water is driven off, before decolorization is attempted; as in evaporation even by a water bath, considerable color is obtained. The thickness of the liquid, renders its passage through the animal charcoal slow, but if thus prepared, a beautiful article can be obtained, very much the color and consistence of good castor oil. That sold as glycerin is considerably diluted, seldom having a greater specific gravity than 1.15 to 1.18, while the pure is 1.25 to 1.27.

With regard to the yield as thus prepared, an approximation was attempted by the following experiment. Three gallons of olive oil, and 15 lbs. (Troy) of English litharge, were made into a plaster, and three gallons of hot water added, and thoroughly mixed. The whole was then allowed to cool, and the liquid accurately drawn off. This was evaporated to the spec. grav. of 1.15, treated with sulphuretted hydrogen, filtered, boiled, and further evaporated, until 18 oz. (av.) Glycerin were obtained, of the specific gravity 1.25. There is an advantage in not allowing the liquid to become so concentrated, before sulphuretted hydrogen is passed into it, as, when it is too thick, its further treatment is rendered more difficult, both to filter the solution clear, and to get rid of the excess of gas, which under all circumstances it is not easy entirely to remove. About 1.1 is a proper density for its addition.

To ascertain the actual quantity of glycerin existing in olive oil, or rather separable by the usual method, half a pint of the best olive oil, was made up with $3\frac{1}{2}$ ounces (Troy) English litharge, into lead plaster. This was thoroughly de-

prived of its sweet taste, by repeatedly boiling it with water, and the resulting liquids were evaporated, and treated as in the former case. The product weighed 323 grains, showing that olive oil by this process, will yield nearly ten per cent of glycerin.

There are also other processes for making this substance. Among these is that where the spent ley of the soap boiler, is used for its preparation. There is also a formula in the Journal of Pharmacy for 1847, in which castor oil is decomposed by hydrochloric acid gas; and by agitation with water, evaporation, and treatment with ether, a syrupy mass is left behind, having all the properties of glycerin.

A small portion was also made by boiling olive oil with the milk of lime, until a union had taken place, mixing hot water with the mass, and drawing off the aqueous liquid. This was treated with carbonic acid, to precipitate any excess of lime, filtered, boiled, and evaporated, until a substance remained, having the taste and appearance of glycerin.

Glycerin, when pure, is a colorless, syrupy liquid, with little or no odor, a very sweet taste, and with a specific gravity of 1.25 to 1.27. It is insoluble in chloroform and ether. When subjected to a gradual increase of temperature, it is decomposed slowly, with the formation of acrolein; but thrown on a red hot surface, it takes fire suddenly and burns with a bright yellow flame. Its chemical reactions are various and very interesting. Its composition is $C_6 H_8 O_6$, or according to some, $C_6 H_7 O_6 + HO$.

It has been suggested that the removal of glycerin from lead plaster, has a tendency to injure its quality both as to adhesion and consistence. But it must be remembered, that formerly, when no attention was paid to the preservation of the glycerin, the malaxation with water which it had to undergo, removed nearly as much of it, as is taken away in the present process. But to make a practical test of the relative qualities of lead plaster, with and without glycerin, two parcels were taken, one containing its full amount, and the other entirely deprived

of it. The consistence of the latter was rather more brittle ; it had a shorter fracture and smoother, with no appearance of moisture, and retained its whiteness longer by keeping. A plaster was spread of each, and neither was thought to be superior to the other in regard to its adhesive properties. And when we consider that the lead plaster of commerce is never entirely *without* glycerin, or *with* the full quantity formed during the decomposition of the oil, it may safely be stated, that little or no deterioration, in the quality of lead plaster, takes place from the abstraction of the quantity of glycerin, which is obtained from it, and reserved for separate purposes.

The costliness of this article, prevents it from general application in pharmacy ; but I think, there are a few cases in which its employment would be advantageous. For instance in the pills of sulphate of quinine, which are directed in cases where it is important that disease should be speedily arrested, it is necessary that they should be quickly soluble in the stomach. Those made from gum and syrup, have been known to pass through the system untouched ; and should any objection be had to the tonic extracts which have sometimes been used, glycerin forms an excellent substitute. A trial was made, using different quantities of glycerin, to the same amount of the sulphate, and it was found, that those made according to the U. S. Pharmacopœia, in 24 hours became hard and brittle, while in the cases where glycerin was used, the entire amount of syrup being replaced by it, the mass retained the proper consistence. In the other cases the quality decreased in proportion to the amount of glycerin, in direct ratio. Glycerin nearly without water was used, being much better than the diluted article seen in commerce ; one drop of the former being equal in weight to two of the latter, and containing about twice as much anhydrous glycerin. There are other cases in which its use would be proper, but I merely propose this as applying to an important and valuable preparation.

As the various uses and peculiar properties of this substance gradually develope themselves, endeavors will be made to dis-

cover new methods to facilitate, and consequently lessen the expense of its preparation; and should any be so fortunate as to succeed in such attempts, and the price be sufficiently reduced, to warrant its general employment, we have every reason to believe, that it will eventually become an important article to the pharmacist, independent of its usefulness in the cause of afflicted humanity.

ART. XXXIII.—ON THE COMMERCIAL VARIETIES OF
GINGER.

BY JONATHAN PEREIRA, M. D., F. R. S.

In the preparation of a third edition of my *Elements of Materia Medica*, I have had my especial attention drawn to the different commercial varieties or sorts of the several articles of the *Materia Medica*, amongst many others to those of ginger. Perhaps the following notice of the varieties of ginger now met with in the English market may not be uninteresting to some of the readers of the *Pharmaceutical Journal*.

I have met with ginger in three different states in the English market, namely, in the fresh state, forming what was termed *green ginger*; secondly, in the state called *preserved ginger*; and, lastly, *dried ginger*, the usual form in which it is sold by grocers and druggists.

1. *Green Ginger.*

Small parcels of this have been brought over from Jamaica. The samples which I have met with were soft, and had the character of rhizomes which had been recently taken out of the ground. I am informed that in a commercial point of view they were worthless, most of them having perished on the journey. Recently none has been imported.

2. *Preserved Ginger.*

As this is chiefly used as a condiment and desert, it will

be unnecessary to describe it. Two sorts are now in commerce.

1. *Jamaica Preserved Ginger*.—This is the finest imported. It comes over in jars (seldom in barrels) of various sizes. Its value is 3s. per lb. duty paid.

2. *Barbadoes Preserved Ginger*.—This is not so fine as the preceding, and is seldom imported, say perhaps only once in two years. It comes packed in jars. Its value is from 2s. to 2s. 3d. per lb.

3. *China Preserved Ginger* is large but stringy. It is generally imported in jars of about 6 lbs. each, seldom in barrels. Its value is 1s. 6d. per lb.

4. *China dry Preserved Ginger* has been sliced before preserving. When preserved it is packed and imported in boxes. It is not often brought into the London market.

3. Dried Ginger.

GENERAL DESCRIPTION.—The *dried rhizome*, called in commerce *ginger-root* (*radix zingiberis*), occurs in flattish, jointed or branched, lobed palmate pieces, called *hands* or *races*. The largest rarely exceed four inches in length. The larger, bolder, and plumper the races, the more they are esteemed in commerce.

Some of the commercial sorts have not been deprived of their *epidermis*, which is dried on them, and give the races a shrivelled character. Other sorts have been carefully scraped and peeled while in the green state. The first are said to be *coated* or *unscraped*; the second, *uncoated*, or *decorticated*, or *scraped*. Considered with respect to the presence or absence of the coat, the commercial sorts of ginger may be thus arranged :—

Uncoated or Scraped.

Jamaica Ginger.

New Malabar “

New Bengal “

Coated or Unscraped.

Barbadoes Ginger.

Old Malabar “

Old Bengal “

African “

Although the color of ginger is an important consideration in determining the commercial value of this root, it is difficult to describe in words the different colors which characterise the various commercial sorts of ginger. The terms *white* and *black* ginger formerly in use, merely mean that some sorts are paler or whiter, others darker or blacker; but absolutely white or black ginger is of course unknown. But the different sorts of ginger pass almost insensibly from the one into the other, so that it is impossible to refer them absolutely to the pale or dark sorts. Mr. Faber tells me that, were he to classify them according to their external color, it would be thus:—

| | | |
|----------------------|----------------------|-------------------------------|
| <i>Grey or Dark.</i> | <i>Intermediate.</i> | <i>Bright Yellow or Pale.</i> |
| Old Bengal. | Barbadoes. | Jamaica. |
| New Bengal. | Old Malabar. | New Malabar. |
| | African. | |

The internal color of ginger and its softness or hardness, as observed by cutting it, is another important character. The brighter and paler the color, and the softer the texture, the more highly is ginger valued. Ginger which is dark and hard, or flinty to the cut, is of inferior value. A transverse section of the larger and more perfect pieces shows an outer, horny, resinous-looking zone, surrounding a farinaceous centre, which has a speckled appearance from the cut extremities of the fibres and cuts.

VARIETIES.—Several varieties of ginger are met with in English commerce. These we may conveniently arrange according to the countries producing them, in three classes: 1st, West Indian; 2dly, East Indian; 3dly, African.

1. *West Indian Gingers.*

This division of gingers includes two sorts, Jamaica and Barbadoes, which may be taken as the types of all other sorts of ginger. Unlike the East Indian kinds, they are rarely wormy.

1. JAMAICA GINGER (*radix zingiberis Jamaicensis*).—

The sort of Jamaica ginger now found in commerce was formerly called *white ginger*, to distinguish it from an unscraped sort, which was termed *black ginger*. The latter does not now occur in English commerce.

Jamaica ginger is imported in barrels holding one cwt. each. It is a scraped or uncoated pale sort. When of fine quality it consists of large, branched, plump, and fleshy soft races, whose texture is fibrous and mealy, and which externally are yellowish white or pale buff, and internally, when cut present a bright but pale tint. Inferior samples consist of small shrivelled races, which have an ash-grey externally, present a brownish color internally when cut, and have a hard or flinty texture. Good Jamaica ginger yields a beautiful bright straw-yellow, somewhat buffy, powder.

2. BARBADOES GINGER (*radix zingiberis Barbadosensis*).—This is imported in bags of about sixty or seventy pounds. It is an unscraped, or coated, somewhat pale sort.

Its races are shorter, less branched, flatter, and darker colored than Jamaica ginger, and are covered with a corrugated epidermis.

2. East Indian Gingers.

This division includes four sorts of ginger, two from the Malabar coast and two from Bengal. They are more liable to be wormy than either West Indian or African ginger.

3. MALABAR GINGER (*radix zingiberis Malabarici*).—Formerly one kind only of ginger was exported from this coast, namely, a coated or unscraped sort, which is sometimes called the “old sort of Malabar ginger,” to distinguish it from the uncoated or scraped kind which of late years has been brought from this part of the world, under the name of “new sort of Malabar ginger.” I shall distinguish them by the terms *coated* and *uncoated*.

a. COATED MALABAR GINGER; *unscraped Malabar ginger*; *old sort of Malabar ginger*; *common Malabar ginger*; *Bombay ginger*. This sort is imported exclusively from

Bombay. It comes over in bags and pockets. It is a coated sort, of a darker color than the West Indian sorts, but paler than the common unscrapped Bengal sort.

In my samples, a portion of the coat (*epidermis*) has fallen or been rubbed off, and the exposed external portion of the body of the ginger is darker colored than the remaining portion of the coat. When cut, the internal surface is found to be rather pale, though somewhat darker than that of Jamaica ginger. The races run small, and not much branched.

β. UNCOATED MALABAR GINGER; *new sort of Malabar ginger; Tellicherry ginger; Calicut ginger; Cochin ginger.* This sort of ginger first appeared in the London market about the year 1841, having been imported by Messrs. Kensington, Payne, and Young. The quality being exceedingly fine, it fetched from 75s. to 100s. per cwt., at the time when the old sort fetched only from 15s. to 20s. per cwt. Its races were large, bold, and very much branched.

When cut into, it was found to be quite soft, even down to the centre, the cut surface presenting a lemon tint. Its flavor was very aromatic. These qualities made it a great favorite with the trade, and, in consequence, it rose in value, and for a time fetched £6 or £7 per cwt. But being brought over in very large quantities, it soon declined considerably in price, and this produced carelessness on the part of the cultivators. Another circumstance which tended to reduce its value was the great havoc committed on it by the worm during the voyage, so that it frequently happened that, upon landing here, whole cases of ginger were converted into mere powder.

The first importation was from Baypore, near Calicut, on the Malabar coast; afterwards some came from Tellicherry, and subsequently large parcels of it have come from Cochin and Calicut, all on the same coast. The quality and flavor of the later importations have been for the most art much inferior to those of the first samples and in gene-

ral the prices have ranged from 42s. to 65s. per cwt. Recently, however, samples of an improved quality have been received which fetched from 65s. to 130s. per cwt.

This sort of Malabar ginger is imported in chests, casks, or bags. It is a scraped sort, and occurs in fine large branching races, having much of the character of Jamaica ginger, but having more of a brownish or reddish tint externally, and being very apt to be wormy. In flavor it resembles the Jamaica sort.

It is said to be grown at or near Calicut, and to be produced by the Jamaica plant transplanted to the Malabar coast; but how true this statement may be I know not.

4. BENGAL GINGER (*radix zingiberis Bengalensis*.) Two kinds of ginger are brought to us from Bengal—the coated or old sort, and the uncoated or new sort.

a. COATED BENGAL GINGER; *common Bengal ginger; old sort of Bengal ginger*. This is imported in bags. It is an unscraped dark-colored ginger. The races are somewhat larger and plumper, and rather less liable to be wormy, than the coated Malabar ginger.

The coat (*epidermis*) is greyish yellow, shrivelled and cracked down the face of the races, exposing the body of the root, which is much darker colored (greyish black) than the coat itself; so that the races are remarkable for their bi-colored character. To the cut it is more or less hard (*flinty* in the language of the dealers,) and presents a darker color than the other sorts. Of all the gingers now met with in commerce, it most deserves the name of *black-ginger*. It is darker colored than the coated Malabar ginger, and is otherwise so peculiar that dealers can never confound the two. Both sorts usually fetch about the same price.

β. UNCOATED BENGAL GINGER; *scraped Bengal ginger; new sort of Bengal ginger; Calicut sort of Bengal ginger*.—Soon after the uncoated or new sort of Malabar ginger came into the market, the Bengal growers, finding that

they could obtain only from 15s. to 20s. per cwt. for ginger, while their Malabar competitors got from 75s. to 100s. per cwt., were aroused to compete with the latter. They accordingly, as I am informed, began to cultivate the new Malabar plant, or, as it was called, the Tellicherry sort. In consequence, large quantities of this new Bengal sort were soon after received from Calcutta, and, being very large and bold in the race, captivated the buyers, who purchased freely at from £5 to £7 per cwt. But upon being brought into use it was found to be destitute of those intrinsically good qualities for which the new Malabar ginger was distinguished. It accordingly fell in price to 35s. or 40s. per cwt., and the original purchasers suffered a loss of at least 50 per cent. It is now scarcely met with.

This kind of ginger is imported in chests of 1½ cwt. It is a scraped sort, and is darker than Jamaica ginger. It is as plump as the new Malabar sort, but the races are not so large. To the cut it is more or less hard or flinty and dark. In its color and hardness it resembles the common or coated Bengal sort; but in plumpness, the uncoated Malabar sort.

3. *African Ginger.*

5. SIERRA LEONE GINGER.—All the African ginger which I have met with has been imported from Sierra Leone. It comes over in casks or bags.

It is a coated or unscraped sort. The races are generally rather larger, but less plump, than those of the Barbadoes sort, which in other respects they resemble, and to which they are about equal in commercial value.

4. *China Ginger.*

Mr. F. Bassermann has described a new sort of ginger from China. This is quite unknown in the English market indeed I cannot find that any of even the most experienced dealers ever heard of China dried ginger.* As, however,

I have heard *Cochin Ginger* called by mistake *Cochin-China Ginger*, and for brevity *China ginger*.

the Chinese export preserved ginger, it is not improbable that they may occasionally have also exported dried ginger; but the former differential duties which existed in England would probably have prevented its introduction here.

Mr. Bassermann states that a cargo of 5000 chests was brought to Amsterdam in 1834 from Canton. The chests were small, containing each about 2½ lbs. Externally they were covered by a dark green paper with black ornaments and Chinese characters; and in addition to the name of the ship there was the following superscription: *Ngo-Nang-Gong, Extra Gember*. Internally, the chests were lined with fine paper, and under the lid there was a red leaf of paper with Chinese writing.

The ginger was large and broad, externally dark brown, and to the fracture dark, shining and resinous. It did not break easily. The epidermis was very wrinkled and shrivelled. The odor and flavor were stronger than those of the best Bengal sort, and were almost equal to the West Indian kind. Its powder was darker than that of either the West Indian or Bengal sorts, and contained some short fibres and dark shining foliaceous parts.

WASHING AND BLEACHING.—The wholesale dealers sometimes wash ginger after its importation, and before it is offered for sale. I am informed that this operation is done with water only. In this state it is termed *washed ginger*. But much of the ginger which is imported is bleached before it is sold to the shopkeepers. This is done by washing it in a solution of chloride of lime and exposing it to the fumes of burning sulphur (*i. e.*, to sulphurous acid.) *Bleached ginger* has a white chalky appearance (whence its name of *whitewashed ginger*), and occasionally a feeble odor somewhat like that of chlorine. Its appearance is supposed to be greatly improved by this bleaching process.

COMMERCIAL ASSORTMENT.—The wholesale dealers assort

some kinds of ginger, according to their quality and commercial value ; but sell other kinds unassorted

a. Assorted Gingers.—The gingers which are assorted are the scraped or uncoated sorts, namely, Jamaica, scraped Malabar, and scraped Bengal ginger. These are assorted into several qualities, usually distinguished either by their price, or as first, second, third, and fourth qualities. Considered with respect to their characters, these assorted gingers may be arranged as follows :

1. Bold, soft, and bright.
2. Smaller, but soft and bright.
3. Flinty and dark.
4. Shrivelled, and only fit for grinding.

β. Unassorted Gingers.—The unscraped or coated sorts do not undergo any assortment, but are sold unassorted. This division includes four sorts, *viz.* :

5. African.
6. Barbados.
7. Common or unscraped Bengal.
8. Common or unscraped Malabar.

On the continent unassorted gingers are the kinds chiefly in use. Barbadoes and African are the best of these sorts. Unscraped Bengal ginger being generally plumper and sounder than unscraped Malabar, is generally preferred to the latter sort.

The following is a classification of ginger according to its commercial value, exclusive of duty, in September 1849, as bought of the importers in Mincing Lane :

| | | | |
|--|---------------------------------|--|---|
| L4 to L7 per cwt. Used in England.) | L2 to L4. (Used in England.) | 30s. to 35s. (Used in England and on the Continent.) | 23s. to 25s. Used chiefly on the Continent. |
| Jamaica. New Malabar. | New Bengal. | Barbadoes. African. | Old Malabar. Old Bengal. |

Pharmaceutical Journal, December, 1849.

ART. XXXIV.—EAST INDIA SENNA.

BY DR. ROYLE, F. R. S., &c.,

Professor of Materia Medica at King's College.

I send you a specimen of the senna grown by Dr. Gibson, and with which he has supplied the military hospitals; the surplus, amounting to 17 cwt., he has sent to this country, to see how it will answer the purposes of cultivators there and of purchasers here. We all know the Alexandrian senna is much adulterated, and it is almost sure to continue to be so, for the demand is much greater than the supply, and thus this is likely to be, with the distant carriage on camels before it reaches the banks of the Nile. The African and Arabian senna, which reaches us by the way of Bombay, and is called East Indian senna, is not appreciated here, though genuine and pure, because it is not carefully gathered nor clean picked. The Tinnevely senna, however, which was grown from Arabian seed, holds the first place in the market, because it is well grown and carefully picked. Many years since I grew senna, in the Saharunpore Botanic Garden, both from Baya senna-seed, and from some seed sent me by Sir Charles, afterward Lord Metcalfe. Both the seeds produced the same species, which I have figured in my *Illustrations of Himalaya Botany*. The senna was pronounced by Dr. Twining, after using it in the General Hospital, equal to the best. The same kind of senna has again been tried in the hospitals at Saharunpore, as I myself had done before sending it to Calcutta. Dr. Bolton who submitted the garden senna to this second set of experiments at Saharunpore, pronounced it equal if not superior to the senna of commerce, acting without griping, and forming an excellent purgative. It was determined in consequence that the Government hospitals should all be supplied with senna grown in the garden, when a planter in the neighborhood of Agra offered to produce it in the

required quantities, and of equal quality, near Agra. Dr. Gibson has however for some years been growing it in the Bombay Presidency for the public service there, and where the senna is equally well approved of. By the small specimen you will see in the form of the leaves that they are those of the true officinal senna. The color is good, and the leaves have been carefully picked. They are smaller than those of Tinnevely senna, being grown in a drier climate, that of the Deccan.—*Pharmaceutical Journal*, February, 1850.

ART. XXXV.—ON THE CEPHAELIS IPECACUANHA.

By M. WEDDELL.

The introduction of ipecacuanha as a European remedy does not date anterior to the end of the seventeenth century. The first discovery of it, no doubt, is due to the Indians who preceded the Portuguese in the Brazilian territories; or, if we are to believe tradition, we may consider man, as in the case of the cinchona bark, to have been preceded by the animals.

The origin of the word *ipecacuanha* is very obscure, and in no part of Brazil is it employed to designate the *Cephaelis*, while, on the contrary, that of *Pouya* is most generally used.

Modern authors who have written on the *Cephaelis ipecacuanha* state it to exist in a vast zone, comprising all the provinces of Brazil, from the equator to the tropic of Capricorn, and between the Atlantic and the mountainous country of the interior. During late years, however, this region has become much extended; and at the present time its longitude is equal to its latitude. In the year 1824 the *Cephaelis* was discovered in the province of Matto-Grosso; but no exportation of it took place until about the year 1832.

It is this part of the Brazils which now wholly maintains the European commerce of it.

The appearance presented by the forests in which the *Cephaelis* grows is not easily forgotten. Nearly all those of Matto-Grosso are situated in the basin of Rio-Paraguay, or its tributaries, about the small village of Villa-Maria. Generally, however, the plant does not grow in the immediate vicinity of rivers, as the periodical inundations to which these are subjected, are unfavorable to its free vegetation.

It is in situations where a slight elevation of land preserves it from these submersions, that the *Cephaelis* is mostly met with. It grows in the shade of those majestic trees which constitute the intertropical forests, and more particularly in the moist sand, impregnated with vegetable remains, which borders on the marshes planted with *Mauritia*, *Iriarteia*, and tree ferns.

In size the *Cephaelis* is scarcely equal to the small daphne of our woods, which it slightly resembles; it rarely grows alone, but almost always in small clumps, that the collectors of *Poaya*, or as they are called *Poayeros*, known by the name of *Redoleros*.

The method adopted in collecting the root of the *Cephaelis* is as follows: The *Poayero* grasps in one hand, if possible, all the stems forming one of these clumps, whilst with the other he pushes under the roots a pointed stick giving it a swinging motion. By this means the earth surrounding the roots gives way, and when the operation is performed with dexterity, they are all withdrawn at the same time, and almost always without fracture. The *Poayero* then separates the portion required, and places it in a bag carried for the purpose; he then proceeds to the next clump, and so on. An ordinary workman may collect in a day about from three to six kilogrammes of ipecacuanha, which in desiccation loses about half its weight. This latter operation takes place in powerful sunshine.

The propagation of the *Cephaelis* is by seed; but in

localities where it is constantly exported it is effected by means of portions of the roots accidentally left in the ground by the *Poayeros*. Each of these fragments after a certain time produces a bud, which forms a fresh plant. The vegetation of the *Cephaelis* in round clumps is also probably consequent on this particular manner of propagation. It, therefore, appears from this fact that the exportation of ipecacuanha will have an effect contrary to many analogous cases, that of subjecting the *Cephaelis* to a mode of cultivation particularly suited to it, and the fires which occur so frequently in the forests, will tend to this favorable result, by clearing the surface of the earth of those accumulations of vegetable matter, which at last frequently choke up and kill even the adult plants themselves.—*Pharmaceutical Journal*, January, 1850, from *Repertoire de Pharmacie*.

ART. XXXI.—ON THE ABSORPTION OF SALINE SUBSTANCES BY CHARCOAL.

By M. ESPRIT.

A very remarkable property of carbon is the precipitation of certain metallic salts from their solution in water by animal charcoal. This curious property, the discovery of which is attributed to M. Payen, appears to have been previously noticed by Schaub. Subsequently M. Payen announced that charcoal removed lime and salts of lime from their solution in water.—A few years later Dubrunfaut, confirmed the observations of M. Payen, and announced as a general principle that the carbon saturated the alkalies and appropriated them; that it, moreover, appropriated the salts, and especially the calcareous salts which occur in the juice of the beet-root after defecation; and he insisted on the advantages which the two-fold property presented in the manufacture of beet-root sugar.—Graham, whose experiments date from 1829, examined prin-

cipally the action of charcoal upon the acetate and nitrate of lead, arsenious acid, nitrate of silver, sulphate of copper and ammonical sulphate of copper, hydrate of lead dissolved in potash, solution of iodine, Labarraque's solution, chloride of lime, and liquid chlorine. He states that, however large the quantity of charcoal employed, he was never able to precipitate arsenious acid and sulphate of copper. The contrary was the case with all the other salts. M. Lassaigne found that charcoal, placed in contact with iodide of starch and with a solution of iodine, removes the iodine from the liquid. M. Dupasquier observed that vegetable charcoal absorbs quickly and even in considerable quantity the alkaline sulphurets. I have repeated this experiment comparatively with vegetable and animal charcoal, and have found that it requires nearly three and a half times more of the former than of the latter to obtain the same result.

In 1845, M. Chevalier published in the '*Annales d'Hygiène*,' that the acetate and nitrate of lead in solution in water, wine, or vinegar, might be removed from these liquids by means of charcoal, with or without the assistance of heat. He was led to believe that this new property would furnish a ready and easy means of removing from some orange-flower waters, which had been kept in badly-tinned vessels, the lead salts they might have dissolved, without depriving the waters of their odor. The experiments which he made on this subject perfectly confirmed his suppositions. M. Chevalier also observes very correctly, that this property of charcoal of combining with the metallic oxides may frequently have been the source of error in chemico-legal inquiries.

This question has also been examined by M. Girardin, who found that not only the majority of salts, but even most mineral substances, were removed from solution by animal charcoal; a property which he turned to excellent account in depriving water in newly constructed reservoirs of a disagreeable flavor, which renders its use for a long time impossible, owing to the lime which it removes from the walls.

I have still to mention the experiments made by Messrs. Garrod and Weppen; but the results obtained by these two chemists are so little in accordance, and differ so much from those published by Prof. Graham, that I have considered it indispensable to repeat their experiments and in different ways, in order to ascertain whether the difference of the results at which they arrived should not be principally attributed to the varied conditions under which they operated. All my experiments were made with three distinct kinds of charcoal:—

1. With animal black, freed from the carbonate of lime which it contained, but still retaining the phosphate.

2. With animal charcoal, digested with hydrochloric acid, and washed with distilled water until what passed through no longer furnished a precipitate with oxalate of ammonia or with nitrate of silver: a considerable quantity of this charcoal, on calcination in a platinum crucible, left but an insignificant residue of silica.

3. With blood-charcoal, calcined twice with a mixture of carbonate of soda and potash, and then washed with distilled water until it no longer furnished a trace of alkaline cyanide.

I tried the action of these charcoals in three different manners: 1st, by mixing a known weight of charcoal with a certain quantity of saline solution, and setting the mixture aside; 2nd, by boiling a known weight of charcoal with the saline solution; 3rd, by filtering the metallic solution through a layer of charcoal placed in the neck of a retort, and acting thus by way of displacement.

Of these different methods, the third is that which appeared to be the most advantageous, only it has the inconvenience of being rather tedious and also somewhat capricious. To obtain a satisfactory result, it is requisite that the filtration should proceed slowly, otherwise some of the liquid passes without being decomposed. The second process is undoubtedly quicker, but it always appeared to require a greater proportion of charcoal for the same quantity of salt.

The solutions of metallic salts upon which I operated are the following:—The acetate, sulphate and nitrate of copper; the acetate, sulphate, chloride of zinc and oxide of zinc dissolved in ammonia; acetate and nitrate of lead; acetate and sulphate of iron; tartar emetic; the nitrate and sulphate of silver; and the chloride dissolved in ammonia; corrosive sublimate; nitrate of cobalt; sulphate of cadmium; arsenious acid; nitrate and muriate of baryta; and the sulphate of soda, potash and magnesia.

With the exception of the three alkaline sulphates, the nitrate of copper and arsenious acid, which appear to be absorbed only within exceedingly restricted limits, all the other salts were absorbed with greater or less energy.

5 parts of blood-charcoal calcined with potash sufficed to precipitate entirely the following salts; acetate and nitrate of lead; ammoniacal sulphate of copper; the sulphate and nitrate of silver, and the chloride dissolved in ammonia; the chloride of zinc, and oxide of zinc dissolved in potash.

20 parts of charcoal are required to precipitate the sulphate and acetate of copper, corrosive sublimate, nitrate of cobalt, sulphate of cadmium, tartar-emetic, sulphate of zinc, and chloride of barium.

The precipitation, however is only perfect by the first five salts; and it appeared very difficult, even by increasing the proportion of charcoal, to remove entirely the last traces of the four others, which are it is true sometimes very minute, but can still be detected. Thus the quantity of tartar-emetic which is not absorbed is so small, that its presence is no longer indicated by sulphuretted hydrogen: but it may still be discovered with Marsh's apparatus.

The proportions of charcoal above indicated are only strictly accurate for the salts of copper; for the others they are only approximative; but they nevertheless approach very closely the true limits. The following is the plan which I followed to ascertain the quantity of charcoal necessary for the absorption of the sulphate and acetate of copper. I dis-

solved in 8 grms. of acid diluted with water 2 grms. of oxide of copper obtained by calcining the nitrate, evaporated the solution to dryness, then redissolved the salt in 100 grms. of distilled water, and placed the solution in a wide mouthed bottle with a ground stopper. I then poured some ammonia into it until the precipitate which formed at first had redissolved, and the liquid had become perfectly clear; the bottle was finally filled with boiled distilled water, and a bright slip of copper, the weight of which was known, inserted. In the course of five days the experiment was completed, and the solution had become perfectly colorless; the slip of copper was then removed, washed, wiped dry with care and weighed. It had lost $\frac{1}{4}$ of its weight. The experiment, repeated several times in the same manner, furnished the same result.

As the oxide of copper contains precisely half the quantity of copper contained in the suboxide, it proved that my primitive solution contained $\frac{1}{4}$ copper. If, therefore, after having been filtered through charcoal, it contained less copper, that must have held it back. A solution of copper was therefore prepared like the preceding, and transferred into the displacement apparatus with 10 grms. of animal charcoal. As soon as the operation was finished, I washed the charcoal with a little distilled water, added this wash-water to the filtered liquid, supersaturated it with ammonia, &c. As soon as the decoloration was complete, I removed the slip of copper to weigh it. It had lost only 0.75 of its weight; the charcoal had therefore retained 0.65 copper, or nearly half of what the solution contained. I repeated the experiment, and obtained 0.70, and a third time 0.75.

With regard to the alkaline sulphates, they always appeared to be absorbed in very minute proportions; for I was not only able to detect their presence readily by means of reagents, but sometimes even from the bitter taste of the solution, especially when the liquid had been slightly concentrated.

I next proceeded to ascertain the quantity of arsenious acid which animal charcoal is capable of absorbing. Prof. Graham had asserted that no absorption occurs; Dr. Garrod states, on the contrary, that it is so perfect and quick, that he did not fear to recommend charcoal powder as a far better antidote to arsenic than the hydrated sesquioxide of iron. I adopted the following plan for testing the correctness of these assertions. After having found that, even on employing considerable quantities of charcoal, arsenious acid was constantly detected in the filtered liquid, I endeavored to ascertain whether any had been absorbed. For this purpose I dissolved 10 grms. of arsenious acid in a litre of distilled water; I then took 10 cub. centim. of this solution, to which I added 10 cub. centim. ClH , with 100 cub. centim. distilled water, and which served to determine the strength of a solution of permanganate of potash, intended for estimating the arsenic according to M. Bussy's process. Having determined the strength of the normal solution, I poured 100 cub. centim. of the solution of arsenious acid over different quantities of charcoal; and when the filtration was finished, I washed the charcoal with a little distilled water, so as to re-obtain 100 cub. centim. Of this I took the first time 10 cub. centim., and added to them 5 cub. centim. ClH and 100 cub. centim. distilled water. I then added with precaution the permanganate of potash.—The following results were obtained with blood charcoal:—

| | |
|-------------------------------|--------------------|
| 10 grms. of charcoal absorbed | 0.2 AsO^3 |
| 20 ... | 0.3 ... |
| 40 ... | 0.4 ... |

Upon boiling the arsenical solution with the charcoal, the results were somewhat different:

| | |
|-------------------------------|--------------------|
| 10 grms. of charcoal absorbed | 0.3 AsO^3 |
| 20 ... | 0.5 ... |
| 40 ... | 0.7 ... |

A still more difficult question remained to be solved—How does the charcoal act under these circumstances? Is

there any reduction? or is it merely a simple phenomenon of mechanical absorption, as in dyeing? I believe the latter occurs most frequently; but would except the salts of silver, and all those metals the oxides of which are readily reduced. I would also except the salts of lead, which appear to be converted, for the greater part at least, into the state of carbonate. This is partly indicated by the white deposit which covers the surface, and even penetrates pretty far into the interior of the layer of charcoal through which a solution of a lead salt has been filtered.

There is likewise frequently a change in the composition of the salt; sometimes a subsalt is formed, and free acid is found in the liquid; sometimes a subsalt is formed, which is retained by the charcoal, whilst a very acid salt passes through in the liquid: this is what undoubtedly happens with the sulphate of iron and the sulphate of zinc, which renders it almost impossible to precipitate the last portions of these salts; frequently, however, it is merely a simple absorption. Thus if 1 grm. of acetate of copper is dissolved in 100 grms. of distilled water, the liquor acidulated with one drop of acetic acid, and the solution poured over 20 grms. of well-washed animal charcoal placed in the neck of a retort, not a trace of copper will be found in the liquid if the filtration proceeds regularly, and not too rapidly; the charcoal may even be washed with 100 grms. of distilled water, the liquids united and concentrated, and still no copper be indicated by reagents. But if the charcoal be triturated in a glass mortar with water, so as to isolate the molecules and thus to assist the solvent action of the water, it removes some of the salt which the charcoal had retained, and its presence is now readily detected.

The following experiment will serve still better to establish my view. 1 grm. of corrosive sublimate was dissolved in 100 grms. of distilled water, and the solution filtered through 20 grms. of well washed animal charcoal. At the end of thirty-six hours half the liquid had passed through;

the presence of a salt of mercury was sought for in it with potash, sulphuret of ammonium, and iodide of potassium, but no change was produced by these reagents.

At the end of twice forty-eight hours the whole of the liquid had filtered, the charcoal was washed with distilled water, and the same tests applied again with the same result. But perhaps the bichloride of mercury had undergone some alteration in its composition in contact with the charcoal; perhaps it had been reduced to a state of protochloride, and consequently become insoluble. Such is the opinion of Weppen; which, however, does not agree with the observation made by Fourcroy, who in his *Système des Connaissances Chimiques*, states in a positive manner that the charcoal has no action upon corrosive sublimate, either with or without the assistance of heat.

The following experiment will, I think, decide the question. The charcoal which had taken up the corrosive sublimate was washed with a mixture of alcohol and ether, which quickly dissolved the mercurial salt in the state of corrosive sublimate and in such quantity, that it became possible to trace, with a tube dipped in it, characters of a brilliant red upon a plate of porcelain which had been moistened with iodide of potassium. The ethereal solution left on evaporation a white powder, which, dissolved in distilled water, furnished with potash an orange precipitate; with hydrosulphate of ammonia, a white precipitate, which soon turned black; and lastly, with iodide of potassium a red precipitate. It appears evident, therefore, that there was no reduction, but a simple phenomenon of absorption, analogous to what takes place in the decoloration of indigo, where the charcoal can be deprived of the coloring matter which it had combined with by an alkaline solution; that is to say, by a substance having a greater affinity for it than the charcoal. The same occurs when the affinity of the charcoal for the corrosive sublimate is overcome by the stronger affinity of the ether or alcohol; the salt can then be re-dissolved; or

as was the case with the acetate of copper, when the affinity of the charcoal was weakened by mechanical means by isolating the molecules, the water is able to re-take up the salt which it had previously abandoned.

This explanation, which I venture to propose will, I think, not appear surprising, for we are prepared for it by the behaviour of charcoal under other circumstances. The way in which it removes lime and calcareous salts is a phenomenon of pure absorption; there can have been no reduction in such a case. Messrs. Bussy and Payen have satisfactorily demonstrated that there is no chemical action in the decoloration of liquids; and the way in which it combines with the bitter principles of vegetables can only be explained by a peculiar affinity.

The attention of chemists was called to this new and curious property by Mr. Warington. It had, it is true, already been pointed out by M. Duburgua, who had long before stated that tincture of gentian was entirely deprived of its bitterness by being filtered through charcoal; by M. Chevalier in 1826; by M. Holph in 1831; and M. Rhighini six or seven years back, who advised the use of charcoal as an excellent plan for obtaining the bitter principle of wormwood.

Notwithstanding all these experiments, the property which this substance possesses of combining with certain organic principles was nearly forgotten, when, in 1845, Mr. Warington again called the attention of chemists to it. Having been requested by a brewer to find a convenient and easy method for decolorizing large quantities of brown ale, so as to give it the appearance of pale ale, he immediately thought of charcoal. The beer was decolorized, but had become perfectly insipid. Little prepared for such a result, Mr. Warington repeated his experiments upon different kinds of beer, and lastly upon infusions of hops, wormwood, decoctions of gentian, nux vomica, and even aloes

All these substances lost their bitter taste except *nux vomica*.

M. Weppen somewhat extended these experiments, and succeeded in causing the bitterness of decoctions of columbo, quassia, cascarilla, and buckbean to disappear.

At the same period, M. Chevalier announced that the salts furnished by organic substances are removed more or less readily and entirely by treatment with charcoal and the assistance of heat; that in some cases the absorbing property of charcoal might be turned to account for isolating the poisonous substances held in solution.

Subsequently, Dr. Garrod proposed charcoal as a certain antidote for all the vegetable alkalies.

Lastly, in a very recent communication, M. Lebourdais has employed charcoal to obtain certain vegetable alkalies: thus, after having deprived a decoction of *ilex* of its bitterness, he was able, by treating the dried charcoal with boiling alcohol, to redissolve the bitter principle; and then, by distilling to a syrupy consistence to remove the greater proportion of the alcohol, and evaporating to dryness, to obtain an amorphous neutral substance, to which he gave the name of *ilicine*. By treating infusions of *Scilla*, flowers of *Arnica*, a decoction of the root of *Colombo* and of *Colocynth* in the same manner, M. Lebourdais obtained what he has called *Scillitine*, *Arnicine*, *Columbine*, and *Colocynthine*.

I have also deprived, by the same means, aqueous solutions of strychnine, sulphate of quinine, decoction of box, root of *Rumex patientia*, of *Simaruba*, the tinctures of columbo, sarsaparilla, dulcamara, cinchona and rhubarb, &c. of their bitter taste.

The tinctures of benzoin, kino, and gamboge, were deprived of their resinous principle to such an extent, as to be no longer rendered turbid by the addition of water.

I was desirous of ascertaining whether any other porous substances possessed this property of charcoal. I tried pumice-stone, and obtained no good result; but by means of

platinum-black I have succeeded in depriving of their taste and color a number tinctures; the tincture of columbo succeeded best; 2 grms. of platinum entirely deprived 8 grms. of tincture of taste, but at the same time there is produced a certain quantity of aldehyde and acetic acid. Unfortunately, the action of platinum black appears to be quickly exhausted; and it does not appear to me to stand in any relation to the force which might be expected from its excessive porosity and extreme division; I am therefore led to believe that the property possessed by charcoal is not solely due to its porosity, but that it is also owing to some peculiar affinity.—*Journ. de Pharm.* Sept. and Oct. 1849, and *Chem. Gaz.* Nov. 16, 1849.

ART. XXXVII.—BOTANICAL AND PHARMACEUTICAL
DESIDERATA.

By SIR WILLIAM HOOKER.

(From the Manual of Scientific Enquiry, Edited by Sir J. F. W. Herschel, Bart.)

AFRICA (INCLUDING ARABIA AND ABYSSINIA.)

Cape Aloes.—What is the particular species of *Aloe* affording the drug of this name? What is the kind used at Bethelsdorp, near Algoa Bay?

Madagascar Cardamom.—Is it *Amomum angustifolium*? Specimens of the plant and fruit should be sent home.

Scitamineous Fruits of Western Africa.—A full collection of these (comprising the various kinds of cardamom), the plants, with roots and fruit, should be transmitted home, with the native names appended to them.

Myrrh.—Is the myrrh of commerce produced by one vegetable species, or several? If by several, specimens of each kind and of the plant affording it are desirable, accompanied by the native appellations. It is particularly im-

portant to know whether the myrrh of commerce be the growth of Arabia or of Abyssinia and the adjacent parts of Africa.

Euphorbium Gum.—What is the species of *Euphorbia* affording the substance thus called in commerce, and which comes from Mogadore? The stems found in the commercial *Euphorbium* are not those of the plant figured in Jackson's *Morocco*, nor yet are they those of *Euphorbia officinarum* or *E. Canariensis*.

Shea Butter.—Living plants and specimens in flowers and fruits are required.

Galam Butter.—Is this identical with the Shea butter of Park?

Camwood.—The source of the dye-wood so called, from the Gold Coast, with specimens of the tree are a desideratum.

Bucku of the South African Hottentots.—To determine the different kinds collected by the natives.

Senna.—What plant yields the African Senna? Richardson says it is brought from Ghat in the Sahara.

African Oak or *African Teak*.—This wood, though largely imported by our royal dockyards from the Western coast of Africa, is totally unknown botanically.

Ichaboe Resin.—The Ichaboe ships did, on more than one occasion, bring from the adjacent shores of Africa a gum-resin, constituted of the dead stems of a *Geranium*, allied to, if not identical with, the South African *Geranium spinosum* of Linnaeus (*Monsonia Burmanni*, D. C.). An account of this substance appeared in Eden's voyage in search for Nitre and the true nature of Guano. London: 1846.) None is now to be procured in England, and it is believed that the nature and property of this singular gum-resin were not examined. Perfect specimens of the gum-resin and the plant are desired.

N. B. Much information remains to be obtained respecting the useful woods, gums, dye-stuffs, &c., of Western Africa.

ASIA (INCLUDING AUSTRALIA.)

[N. B. Being sent by way of the Red Sea, it may be remarked that some of the products, enumerated under this head are derived from Abyssinia, Arabia, or the east coast of Africa.]

Ammoniacum.—Determine the true origin of this gum-resin by specimens of the plant yielding it in Persia, forty-two miles south of Ispahan. Another kind is equally worthy of inquiry from Morocco in Africa, with the gum-resin and exact locality.

Sagapenum.—A gum-resin: its source? It is said to come from Persia, and to be derived from a *Ferula*. Specimens of the plant with the gum-resin which it affords are desirable.

Galbanum.—Whence obtained? It is brought to us from Singapore and Persia.

Gamboge.—Specimens in flower, and the fruit of the plant affording the gamboge of Siam, and the mode of extracting this and other kinds of gamboge, such as that of Ceylon, &c.

Animi Gum, or *Piney Varnish*, said to be produced by *Vateria Indica*.

Copal.—The origin of this gum-resin in India?

Bdellium.—The source of the Persian and African *false myrrhs* of this name, the localities producing them, the native names, and specimens both of the products and the plants.

Olibanum.—The above remarks apply to olibanum.

Elemi.—The source of the five varieties of Elemi, viz: 1. Holland Elemi. 2. Brazilian Elemi. 3. East Indian Elemi, in bamboos. 4. Manilla Elemi; and 5. Mexican Elemi. Samples from the various countries, with the plants and native appellations, should be transmitted for verification. Is any *Elemi* procured from Ceylon? (Obtain perfect specimens.

Tragacanth.—The tragacanth of Mount Ida and Moun

Libanus have never been correctly traced to the plants which yield them, nor has Tournefort's relation of the formation of this substance in the bark been confirmed. It is still more important to ascertain if the tragacanth of Eze-room is brought into British commerce, and whether it is yielded by the *Astragalus strobiliferus*.

Senna.—The source of the East Indian or Mocha senna. Is it really the foliage of *Cassia lanceolata*?

Catechu.—To observe the processes by which the various kinds of *Catechu*, *Cutch*, *Terra Japonica*, and *Gambir* are obtained; and if from trees, whether from others besides *Acacia Catechu*, *Areca Catechu*, and *Uncaria Gambir*. We want to identify the trees with the respective extracts.

Cubebs.—Does *Piper Cubeba* or *Piper Caninum* in Java yield cubebs? If both, which gives the best?

Cassia.—Botanical specimens of the plants seen to yield *Cassia bark* in Kwagse, China, Malabar, Egypt (and Brazil.)

Cassia-buds of the grocers'-shops.—To procure specimens of the bark in Cochin China, and Japan, and flowering specimens for the Herbarium.

Rhubarb.—The true source of the medicinal rhubarb, and especially of the Batavian Rhubarb. Strange to say, we are still in the dark respecting the real origin of this most valuable drug! In this and all such cases the drug should be procured by one who is an eye-witness to its being gathered, and specimens of the foliage and fruit should accompany it, and be carefully dried for the Herbarium on the spot.

Arrow-root.—The sources of the East Indian arrow-root. It is made largely at Travancore.

Salep.—The different plants which yield salep in Asia Minor, Persia, and especially the best kinds.

Aloes.—The true sources of the Soccotrine, Clear, Bombay, Hepatic, East Indian, and Mocha aloes.

Minia Batta or *Stone Oil*, from Borneo.—Whence is this solid oil or fat obtained? Is it abundant or rare?

Gutta Percha.—That of Singapore is ascertained to be the product of a new plant, *Isonandra Gutta* of Hooker, in the *London Journal of Botany*, vol. vi. p. 331, 463, tab. 17. (*Pharmaceutical Journal*, vol. vii. p. 179.) The appearance of the inspissated gum, which is imported from Borneo under that name, indicates a different source. Other Malay islands are said to afford *gutta percha*, but probably from yet other plants. This should be inquired into: the chemical characters of the juice in a fresh state should be ascertained, and compared with those of caoutchouc.

Green Tea.—Is indigo or any other vegetable die used to colour the green tea in the northern provinces of China? Specimens of the plant and dye so employed are desiderata. Is turmeric or any yellow vegetable dye used in conjunction with it, or with Prussian blue?

Japan Wax.—The true source of this wax.

Assafœtida.—From what species of *Ferula* is this extracted, and how? Does the same species yield the *Tear assafœtida* and the *lump*? Specimens of the one or several assafœtida plants should be procured, with the gum-resin produced by each species.

Patchaouli, or Puchá Pát.—A well known perfume, of comparatively recent introduction to Europe. It is referred to a plant now described by botanists under the name of *Pogostemon Patchaouli*; but we are ignorant of the mode of its preparation and the exact locality where it is produced.

Sago of Japan.—Is it from a *Cycas*, and what species? Also specimens of sago in different stages of manufacture, with the trees yielding them, from the various parts of the Indian Archipelago; so that we may identify the particular kinds of sago yielded by the several sago-palms. Is the Ceylon sago the granulated pith of the *talipot-palm* (*Corypha umbraculifera*)?

Korarima.—A large kind of cardamom, or aromatic

fruit (an *Amomum*?) found in the markets of Shoa, but probably the produce of a country farther to the west.

Scammony.—Particulars of the manufacture—or, to speak more correctly—the adulteration of scammony, carried on at Smyrna. What is the purgative resin or gum-resin (if any) which is added, with the view of increasing the bulk and the medicinal activity of the mixture?

Camphor Oils.—There are two sorts: one brought from the East, does not deposite crystals by keeping; the other does. Is the former the produce of *Dryobalanops Camphora*? If so, what is the source of the latter? Is it obtained from the foliage of *Laurus Camphora* (*Camphora Officinarum*, Nees,) or is it an artificially manufactured article? The camphor deposited is said to be similar to common camphor.

Kino.—All particulars of details about the manufacture of East Indian kino (*Pterocarpus marsupium*) are desirable.

Turmeric.—The several commercial sorts of turmeric differ so much in external character as to throw doubt on the identity of their origin. Are they not the produce of several species of *Curcuma*? Well dried specimens accompanying the root, should be transmitted from different parts of India.

The Grass-Oils.—The grasses used in India for affording the oils imported as grass-oils, lemon-grass-oil, and essence of verbena, or verbena-oil, to be ascertained, and samples sent home, with details of the manufacture.

Storax of commerce is supposed to be obtained from the *Liquidambar orientale* of Cyprus, and comes by the Red Sea from the Persian Gulf: but the subject requires investigation, for others believe the plant grows in Cobross, an island of the upper end of the Red Sea. Dr. Pereira has ascertained that the *liquid storax* comes to us by way of Trieste; the storax of the Indian Archipelago is yielded by the *Liquidambar altingia* of Blume.

Adelaide Resin.—What is the source of the red resin from the colony of South Australia?

(*N. B.* The various gums yielded by many trees and barks affording tannin in Australia require careful investigation.)

Is the true *cinnamon* of Ceylon the production of one species, or are other kinds employed? What occasions the red color of the oil of cinnamon from Ceylon?

Tacamahaca of Ceylon.—Specimens obtained from *Calophyllum inophyllum* are desirable in order to aid pharmacologists in accurately determining the *Tacamahaca* of European commerce.

Ceylon (Long or Wild) Cardamom.—What is the plant so called in Ceylon, and named by Mr. Moon *Alpinia Granum Paradisi*? Can it be identical with the true *Grains of Paradise* of the western coast of Africa?

Rice paper of China.—This has been incorrectly referred to the Shola (*Æschynomene asperata*;) but we are still quite ignorant of the origin of this familiar and exquisitely delicate substance. It is the pith of some plant, but what?

—*Pharm. Journal, Dec. and Jan.*

ART. XXXVIII.—PROGRAMME OF PRIZE PROPOSED BY THE
SOCIETY OF PHARMACY OF PARIS.

It has long been an important question with pharmacologists how to obtain a substitute for sulphate of quinia possessed of the same therapeutic effects, or how to reduce the price of its production so as to permit its employment in all the numerous cases in which its use is indicated.

This question has been examined in its different phases in numerous publications; it would be useless to enter more at large upon the advantages which attach to its solution.

The Society of Pharmacy have thought that the problem

could be attacked directly with some chance of success, and that in the actual state of science, it is not impossible to accomplish the direct formation of the sulphate of quinia. They have therefore resolved to make an appeal to chemists on this subject, in the hope that it will be duly responded to.

A few years since it would have been thought an act of temerity to demand of chemists a process by which to produce, directly from inorganic elements, a substance which is a product only of organic life. But, in her progressive march, science has discovered that certain substances, which are ordinarily the products of living tissues, may be formed directly and independently of these.

Thus urea, to cite a common example, it is universally admitted, may be produced, with carbon, hydrogen, oxygen and nitrogen; and the time is not far distant, it is thought, when the general problem shall be solved, and any organic compound of known composition can be reproduced from the inorganic elements which compose it, either by imitating a synthetic process of nature, as yet unknown, or by the employment of means which the chemist already employs, as for instance in the preparation of artificial urea.

As regards the organic alkalies, a great number are already known, and among these are many which are exclusively artificial products.

The various modes of preparing this species of compounds, are so well understood, that it is as easy to obtain a new alkaloid as to prepare an acid, alcohol or ether. Many organic alkalies besides that of the urine, have been artificially obtained, and it is not the first time that chemists have published the opinion, that the alkaloids of cinchona and opium could be prepared artificially. MM. Dumas, Gerhardt, Kopp and others, have heretofore expressed such an expectation. By the remarkable work of M. Wurtz, the existence of a great

number of artificial alkaloids is made known, all of which are derived from ammonia, and expressed by the formula $-(A^x H^y) (C^m H^{m-6})$ that is to say, ammonia and carbo-hydrogen. Each of these alkaloids thus constitute one end of a series, of which the carbo-hydrogen is the initial, or in other words, the carbo-hydrogen being given, may be formed by combination with ammonia into an alkaloid, just as we obtain from one compound radical, an alcohol, an aldehyde, an acid, an ether, &c., according as it is combined with variable equivalents of water and of oxygen.

The principal processes as yet adopted for obtaining the alkaloids, are the following:—

1st. The decomposition of certain ammoniacal compounds, as urea, by the decomposition of cyanide of ammonia. Furfuran from furfuramide. Amarin from hydrobenzamide. Melamin from sulpho-cyanuret of potassium.

2d. By the reduction of certain nitrogenized compounds, by sulphuretted hydrogen, or by hydro-sulphate of ammonia.

Anilin is thus obtained from nitro-benzide. Toludin by the reduction of nitro-benzoën. Cuminin also from nitro-cumèn.

3d. By the distillation of certain organic matters under the influence of potassa; they are:

Quinolein, produced by the action of potassa on quinia, cinchonia and strychnia. Anilin, by the action of potassa on isatin. Conicin, by the action of potassa on the unknown principle of hemlock. Nicotin, by the action of potassa on nicotianin from tobacco. Valéramin or amyli-aque, produced by the action of potassa on cyanate of amyène.

4th. The dry distillation of certain products. The distillation of coal furnishes anilin, designated under the name kyanole. Quinaléin, designated as leucol, pyrrhol, picolin, &c.

5th. Some alkaloids are obtained by the desulphuration of certain essences or sulphuretted alkaloids. Thus sinamin and sinapolin are obtained from essence of mustard.

6th. In fine, it is possible by submitting the alkaloids as found in nature to certain reactions, to obtain a great number of other products possessing equally alkaline properties. To this class belong especially, all the products obtained by substituting chlorine, bromine, iodine, &c. for one or more equivalents of hydrogen in the compound.

Influenced by these considerations, the Society of Pharmacy of Paris, propose a prize of 4000 francs for the chemist who shall discover the means of preparing Quinia, artificially, that is to say, without employing in its preparation, either cinchona bark or other organic matter containing quinia ready formed.

In case this desideratum shall not be attained, the prize will be awarded to the author of the best work making known a new organic product, natural or artificial, having therapeutical properties equivalent to those of quinia, and which it will be possible to substitute for it in commerce.

The essays to be addressed to the Secretary General of the Society before the 1st of January, 1851.

Candidates who desire to keep their processes secret may envelop, under seal, the descriptions which are not designed to be made public. On the demand of such an one, the commission will designate one of its members, who will take the sole cognizance of the proceedings; he will attend its execution in his presence. Verbal description of the operations shall be heard, and placed under seal in the hands of the General Secretary of the Society. The commission will maintain the opinion of its delegate.

In all cases the specimens of products obtained should be presented to the Commission and to the Society to be submitted to experiment, if judged desirable. The total quantity of the specimen should not be less than 250 grammes.

Signed,—Hottot, Guibourt, Boüchardat, Gaultier de Claubry, Buignet, and Bussy, reporters.—*Journal de Pharmacie*.

ART. XXXIX.—ON THE EXPLOSION OF BURNING FLUIDS.

By E. N. HORSFORD.

Rumford Professor in the University of Cambridge, U. S. A.

It has been maintained that several of the various preparations under the general denomination of *burning fluids* are, in certain conditions, explosive. It has been asserted by vendors, on the other hand, that they are not explosive. Wherein the misapprehension lies, how the numerous accidents that have occurred in the use of burning fluids are to be explained, and by what precautions the repetition of these accidents may be prevented, have been subjects of experimental inquiry.

a. The *burning fluids*, as a class, are rectified spirits of turpentine, or turpentine with an admixture of a small percentage of highly rectified spirits of wine, or of some other inflammable body readily soluble in turpentine or alcohol. *b.* Turpentine, alcohol and ether, when fired in an open vessel, burn at the surface so long as a supply of oxygen is kept up. *c.* A slight report attends the flash of flame at the commencement of the combustion. *d.* The accidents with burning fluids have ordinarily occurred during the filling of lamps from the cans, and always in the presence of flame, from a burning lamp or other source.

In these facts (*a, b, c, d,*) lies the explanation of the phenomena that have been observed.

It is well known that a mixture of hydrogen and oxygen in the proportion of 2 vols. of the former to 1 of the latter is eminently explosive: and that atmospheric air in larger measure may be substituted for oxygen with somewhat

diminished explosive tendency of the mixture. An admixture of oxygen with the hydrocarbon used for city illumination is explosive. Atmospheric air may be substituted for oxygen, as in the case above, with the like effect.

The above considerations suggested the idea, that in the chamber over the burning fluid, in the flask or can from which the lamps are filled, there might be an admixture of the vapor of the burning fluid in such proportion with atmospheric air as to make it susceptible of explosion. To test the value of this suggestion, experiments were made with alcohol, ether, and a kind of burning fluid in general use:—

Experiment 1.—A current of air was directed into the upper part of a loosely-stoppered half-filled laboratory glass spirit-lamp while burning, causing thereby a mixture of alcohol, vapour and air to rush past the flame. After a moment or two the jet took fire, and was instantaneously followed by explosion. This result was uniform.

Experiment 2.—After permitting a drop of alcohol, in a large glass flask with a small neck, to evaporate for an instant, upon applying flame to the mouth, explosion resulted frequently, though not so uniformly as in Experiment 1.

Experiment 3.—Ether, similarly treated in a glass flask, yielded less uniform results, because probably of the greater difficulty of obtaining the proper mixture of ether and air.

Experiment 4.—A kind of *burning fluid*, in extensive use, and said by the vendors to be *not explosive*, was subjected to similar experiment, with still less frequent affirmative results. They were sufficient however to show that explosions with it are possible. Similar experiments have been made with another variety of burning fluid by Dr. Morrill Wyman of this city (Cambridge,) with like results.

It is therefore established, that when the proper amounts of burning fluid, vapor and atmospheric air are mixed together, as they may be, in the upper part of a partially filled can or receiver, and a flame is brought sufficiently

near, explosion must result. If the quantity of mixed gases be large, the explosion may cause the destruction of the containing vessel; or, if that remain entire, it may drive out a portion of the fluid, which, taking fire, may cause more or less injury.

The course of safety has been pointed out by the dealers in these articles for illumination. It is, to fill the lamps (the tops of which are without special air-holes, and which screw on) in the *absence of flame*, by daylight for example; in which case no explosion can occur.

Accidents similar to those with burning fluids have taken place in the use of the so-called air-tight stoves for burning wood. After the wood has been fired, and the supply of air for some time shut off, on reopening the draft (and sometimes without, there is reason to believe) occasional explosions of great violence have occurred, attended sometimes with the partial destruction of the stove. The probable explanation is the following.

After firing the wood and shutting off the draft, destructive distillation commences. Inflammable gases issue from the wood, which, mingling with air derived from the pipe or remaining still unconsumed, furnish a mixture becoming more and more explosive, until at length the proper proportions having been obtained, the incandescent coal or a jet of flame causes explosion.

As these accidents are not of frequent occurrence, it may be found that the probability of producing inflammable gases in the required quantity is less with some varieties of wood than with others.—*Chemical Gazette*, Feb. 1, 1850.

ART. XL.—NEW PROCESS FOR EXTRACTING SUGAR FROM THE SUGAR CANE.

BY M. MELSENS.

The following account of the new and important method of extracting sugar from the sugar-cane, is abridged from the first of two long articles recently published in the *Cour. de l'Europe*.

The great difficulty which has been experienced up to the present time in the preparation of sugar, has been owing to the rapidity with which it, when dissolved in water, alters by exposure to the air in hot climates. It must, however, be clear, since the cells of the sugar-cane are themselves full of sugar dissolved in water, and this solution can be kept for a long time in them, without undergoing any alteration at all, that if the same conditions which exist in nature could only be obtained in practice, there is no reason why an artificial solution of sugar may not be kept unaltered for a considerable space of time; or in other words, why water should not be used for the purpose of dissolving the sugar out of the crude juice expressed from the cane.

The difficulties, indeed, are not owing to the sugar or to the water, but to the air, and the ferments produced by its action on the crude sap of the sugar-cane. The object of M. Melsens was, then, to exclude the air from the sap when extracted from the cane, and to prevent the formation of any ferments which might change the character of the saccharine matter. This he has succeeded in doing by availing himself of the well-known affinity of sulphurous acid for oxygen gas. Sulphurous acid, however, alone was found not to answer the purpose; the sulphuric acid, produced by the absorption of oxygen by sulphurous acid, acting on the sugar, converts it into grape sugar. This difficulty has been overcome by using sulphurous acid combined with a powerful base, which, as the sulphurous acid

is converted into sulphuric acid, combines with the latter and forms an insoluble salt.

The acid sulphites, and more especially the bisulphite of lime, were employed by M. Melsens for the double purpose of preventing fermentation by the action of the sulphurous acid, and of neutralising the sulphuric acid as fast as it formed by means of the lime.

Sugar candy dissolved in cold water containing bisulphite of lime, even in excess, crystallized entirely, and without undergoing any change, by spontaneous evaporation, at a low temperature. Several other experiments of the same nature, but differing in their details, always gave the same result; in each the sugar crystallized out by spontaneous evaporation, without any loss either in quantity or in quality, and without any appearance of molasses. In these experiments, the sugar dissolved in water, containing bisulphite of lime in excess, was boiled, and then left to evaporate, sometimes after being filtered, sometimes without any filtration at all.

From the experiments which M. Melsens has made with bisulphite of lime, it is probable that if a cold solution of this salt were to be poured on the sugar cane grinder, so as to mix with the juice the moment that it is expressed from the cane, the sugar might be kept for some time, and might be exposed to the heat necessary for its clarification without any sensible loss or deterioration.

But this same salt also possesses the property of coagulating, at a temperature of 212° , milk, white of egg, blood, yolk of egg mixed with water. At a temperature of 212° , bisulphite of lime acts as a clarifier. It separates the albumen, caseum, and other similar azotized matters which are found in the sugar cane. This separation is effected without appreciable loss in the quantity, or deterioration in the quality, of the sugar.

Bisulphite of lime, moreover, rapidly and tolerably effectually bleaches the colored substances found in the sugar

cane; it prevents the formation of other colored matters produced by the action of air on the pulp of the cane; it also stops the production of those which are formed during evaporation, and above all of those which require for their developement the joint action of air and a free alkali.

It seems that colored substances, which, under ordinary circumstances, are formed spontaneously by the exposure of the pulp of the sugar cane to the air, never make their appearance when bisulphite of lime is employed. By evaporating, at a low temperature, bisulphite of lime mixed with—1, a common solution of sugar; 2, the crude sap of the sugar cane; 3, the juice of beet root; no coloration was produced. By an evaporation of the same substances at a high temperature, the coloration was scarcely visible; indeed, with red beet root the color was completely destroyed, and the sugar obtained was perfectly white.

It seems, then, that bisulphite of lime can be employed in the extraction of sugar:—1st, as an antiseptic, preventing the production and action of any ferment; 2nd, as a substance greedy of oxygen, opposing any alteration that might be caused by its action on the juice; 3, as a clarifier coagulating at a temperature of 212° all albuminous and other coagulable matters; 4th, as a body bleaching all pre-existing colored products; 5th, as a body opposing itself in a very high degree to the formation of colored substances; 6th, as a base capable of neutralising any hurtful acids which might exist or be formed in the juice, and substituting in their place a weak inactive acid, namely, sulphurous acid.

M. Melsens is of opinion that sugar can be obtained from the sugar cane with no other source of heat than a tropical sun, excepting only for the purpose of clarification; indeed, the bisulphite of lime prevents the crude juice of the cane, or the syrup obtained therefrom, from undergoing any changes; great rapidity in the process of crystallization, indispensable at present, becomes by using this salt unneces-

sary ; and more than this, the quantity of sugar now lost in the bagasse, in consequence of the impossibility of washing it out unchanged, can be all collected by being dissolved in water charged with bisulphite of lime.

The only objection that can be made to the above process is, that the sugar obtained by means of bisulphite of lime has a sulphurous taste ; this is true, but the taste is completely lost—1st, by crushing the sugar and exposing it to the air, whereby the little sulphite of lime which there may be is converted into a tasteless sulphate ; 2d, by exposing the sugar to an atmosphere containing ammonia ; if this is done the sugar acquires a very agreeable flavor of vanilla ; but is apt to become a little discolored ; 3d, by clarifying it until it loses 10 per cent. of its weight ; by this process a pure white sugar can be obtained, which will bear comparison with any sample produced at present. The last is the process recommended to be used on a large scale. The quantity of sugar which can be obtained from the sugar cane by adopting bisulphite of lime, as above recommended, is at least double that obtained by the usual processes.

In consequence of M. Melsens having made all his experiments on the sugar cane at Paris, and therefore on a small scale, he is not able to state how bisulphite of lime can be best used in the large colonial sugar manufactories, but is compelled to leave the application of the principles on which his method depends to the intelligence of the manufacturers themselves.

In the preparation of beet root sugar bisulphite of lime is quite as useful as in the extraction of cane sugar ; the way in which it is to be employed in the former is fully explained in the second article published in the 507th number of the *Courier de l'Europe*, to which we must refer those among our readers who desire any further information on the subject.—*Chemical Gazette*, January 15, 1850, from *Gard. Chron.* December 15, 1849.

ART. XLI.—PATENT GRANTED TO ROBERT OXLAND AND JOHN OXLAND FOR IMPROVEMENTS IN THE MANUFACTURE OF SUGAR.

These improvements in the manufacture of sugar consist in the employment of the acetate of alumina for defecating cane and beet-root juice, and of both defecating and removing the color from the solutions of raw sugar produced in the operation of sugar refining.

The process for sugar refining is conducted in the following manner:—The raw sugar may be blown up in the usual manner, but it is preferred to dissolve the sugar in water, with the aid of heat from steam, passing through a flat coil of pipe, into an outer jacket surrounding the pan, and then carbonate of lime, in fine powder, should be mixed with the syrup, until all acidity should be neutralized, and the solution should be made to boil at a temperature of 220° Fahrenheit. The syrup should then be run into the ordinary filter bags, and when running bright from them, it should be turned into another but more shallow blow-up pan, fitted in the same manner before described. Acetate of alumina is now to be mixed with the syrup, and the whole boiled together at a temperature of 220°, until the greater portion of the acetic acid has been evolved, which may be ascertained by testing the steam passing off from the syrup with blue litmus paper. A steam-tight cover and pipe, fitted to a condensing apparatus, may be employed to save the acetic acid evolved, which may be used for the preparation of further quantities of acetate of alumina.—When nearly the whole of the acetic acid has been evolved, small quantities of a solution of tannin in water are stirred in until no further precipitation is produced thereby. The process is completed by the addition of carbonate of lime, in fine powder, in sufficient quantity to neutralize all acidity. The syrup is then passed through bag filters, and as soon as it runs bright, it is turned into the reservoir from

which the vacuum-pan is supplied. It has been found that one filtration through the bags is sufficient, provided a larger quantity of acetate of alumina be employed, and a fine copper sieve be interposed between the liquor running down from the blow-up pan and the head of the bag-filters.

The boiling of the vacuum-pan is conducted in the usual manner, as are also the whole of the subsequent operations. In the preparation of fine liquor, to be employed subsequently to what is termed the claying operation, it has been found desirable to use a small quantity of alumina, heating the syrup to which it has been added to 212° Fahr. for a few minutes, then adding sufficient of the solution of tannin, to precipitate the last traces of alumina, and of carbonate of lime, to neutralize acidity; and finally, passing through filter-bags. Cane and beet-root juice are treated with the acetate of alumina and solution of tannin for defecation, either before the neutralization by lime and concentration by heat, or subsequently, when the juice has been concentrated to from 20° to 28° Baumé.

The acetate of alumina is prepared in the following manner: Sulphate of ammonia is dissolved in cold water, added a clear solution of soda-ash, also made in cold water, added to it, until an alkaline reaction is produced on reddened litmus paper. The liquor is allowed to stand until the alumina is precipitated, the clear liquor then drawn off, and the precipitate washed with a fresh quantity of water, which is again removed, and the washing repeated until the hydrometer no longer indicates the presence of any soluble matter.

The precipitate is taken with as little water as may be, and acetic acid added in successive quantities, until the whole or nearly all of the alumina is dissolved, avoiding an access of acid. The acetate of alumina acts best when recently prepared.

The solution of tannin is prepared by digesting one pound of crushed valonia in two gallons of hot water, using the

clear liquor ; but it may be prepared by other means. As different sugars differ in their qualities, no exact rule can be given as to the quantity of acetate of alumina to be used; but the operator will readily ascertain the quantity required in each case, by taking a sample of the juice or sugar, and testing it with a measured quantity of acetate of alumina. The patentees have found that the best effect is produced on a fair sample of Jamaica sugar, by employing at the rate of four pounds of alumina, dissolved in acetic water, to one ton of sugar.—*Chem. Gaz.*, Nov. 16th, 1849.

ART. XLII.—ON THE DIFFUSION OF LIQUIDS.

BY PROFESSOR GRAHAM.

[Abstract of the Bakerian Lecture, delivered before the Royal Society,
21st December, 1849.]

The Lecturer commenced by observing, that a salt or other soluble substance once liquified and in a state of solution, is evidently spread or diffused uniformly through the mass of the solvent by a spontaneous process. It has often been asked whether this process is of the nature of the diffusion of gases, but no satisfactory answer to the question appears to be obtained, owing, he believed, to the subject having been studied chiefly in the operations of endosmosis, where the action of diffusion is complicated and obscured by the imbibing power of the membrane, which appears to be peculiar for each soluble substance, but not necessarily connected with the diffusibility of the substance in water. Gay Lussac proceeded upon the assumed analogy of gaseous and liquid diffusion in the remarkable explanation which he suggested of the cold produced on diluting certain saline solutions, namely, that the molecules of the salt expand into the water like compressed gas admitted into additional space. The phenomena of solubility were at the same time con-

sidered by that acute philosopher as radically different from those of chemical affinity, and as the result of an attraction which is of a physical or mechanical kind. The characters indeed of these two attractions are strongly contrasted.—Chemical combination is uniformly attended with the evolution of heat, while solution is marked with equal constancy by the production of cold. The substances which combine chemically are the dissimilar, while the soluble substance and its solvent are the like or analogous in composition and properties.

It was further premised, that two views may be taken of the physical agency by which gaseous diffusion itself is effected, which are equally tenable, being both entirely sufficient to explain the phenomena. On one theory, that of Dr. Dalton, the diffusibility of a gas is referred immediately to its elasticity. The same spring or self repulsion of its particles, which sends a gas into a vacuum, is supposed to propel it through and among the particles of a different gas. In the other theory, the existence of an attraction of the particles of one gas for the particles of other gases is assumed. This attraction does not occasion any diminution of volume of gases on mixing, because it is an attraction residing on the surfaces of the gaseous molecules. It is of the same intensity for all gases; hence its effect in bringing about intermixture is dependent upon the weight of the molecules of the gases to be moved by it, and the velocity of diffusion of a gas comes to have the same relation to its density on this hypothesis as upon the other. The surface attraction of molecules assumed, will recall the surface attraction of liquids which is found necessary to account for the elevation of liquids in tubes, and other phenomena of capillary attraction.

The apparatus used in studying the diffusion of salts and other substances into water was very simple. It consisted of an open phial, to contain the solution of the salt to be diffused, which was entirely immersed in a large jar of pure

water, so that the solution in the phial communicated freely with the latter. Phials cast in a mould of the capacity of four ounces of water, or more nearly 2,000 grains, were generally employed, which were ground down to a uniform height of 3.8 inches. The neck was 0.5 inch in depth, and the aperture or mouth of the phial 1.25 inch in diameter. The phial was filled up with the solution to be diffused till it reached the point of a pin, dipping exactly 0.5 inch into the mouth of the bottle. This being the solution cell or bottle, and the external jar the "water jar," the pair together form a "diffusion cell." The diffusion was stopped generally after seven or eight days, by closing the mouth of the phial with a plate of glass, and then raising it out of the water jar. The quantity of salt which had found its way into the water jar—the diffusion product as it was called—was then determined by evaporating to dryness.

The characters of liquid diffusion were first examined in detail with reference to common salt.

It was found, first, that with solutions containing 1, 2, 3, and 4 per cent. of salt, the quantities which diffused out of the phials into the water of the jars, and were obtained by evaporating the latter, in a constant period of eight days, were as nearly in proportion to these numbers, as 1, 1.99, 3.01, and 4.00; and that in repetitions of the experiments, the results did not vary more than 1-40th part. The proportion of salt which diffused out in such experiments amounted to about 1-8th of the whole.

Secondly, that the proportion of the salt diffused increases with the temperature; an elevation of 80° Fahr. doubling the quantity of chloride of sodium diffused in the same time.

The diffusibility of a variety of substances was next compared, a solution of 20 parts of the substance in 100 water being always used. Some of the results were as follows, the quantities diffused being expressed in grains:—Chloride of sodium 58.68, sulphate of magnesia 27.42, sulphate of

water 69.32, crystallised cane sugar 26.74, starch sugar 26.94, gum arabic 13.24, albumen 3.03. The low diffusibility of albumen is very remarkable, and the value of this property in retaining the serous fluids within the blood-vessels at once suggests itself. It was further observed, that common salt, sugar, and urea, added to the albumen under diffusion, diffused away from the latter as readily as from their aqueous solutions, leaving the albumen behind in the phial. Urea itself is as highly diffusible as chloride of sodium.

In comparing the diffusion of salts dissolved in ten times their weight of water, it was found that isomorphous compounds generally had an equal diffusibility, chloride of potassium corresponding with the chloride of ammonium, nitrate of potash with nitrate of ammonia, and sulphate of magnesia with sulphate of zinc. The most remarkable circumstance is, that these pairs are "equi-diffusive," not for chemically equivalent quantities, but for equal weights simply. The acids differed greatly in diffusibility, nitric acid being nearly four times more diffusive than phosphoric acid; but these substances also fell into groups, nitric and hydrochloric acids appearing to be equally diffusive; so also acetic and sulphuric acids. Soluble subsalts and the ammoniated salts of the metals present a surprisingly low diffusibility. The quantities diffused in similar circumstances of the three salts, sulphate of ammonia, sulphate of copper, and the blue ammonia sulphate of copper being very nearly as 8, 4, and 1.

When two salts are mixed in the solution cell, they diffuse out into the water atmosphere separately and independently of each other according to their individual diffusibilities. This is quite analogous to what happens when mixed gases are diffused into air. An important consequence is, that in liquid diffusion we have a new method of separation or analysis for many soluble bodies, quite analogous in principle to the separation of unequally volatile substances in the

process of distillation. Thus it was shown that chlorides diffuse out from sulphates and carbonates, and salts of potash from salts of soda; and that from sea-water the salts of soda diffuse out into pure water faster than the salts of magnesia. The latter circumstance was applied to explain the discordant results which have been obtained by different chemists in the analysis of the water of the Dead Sea, taken near the surface; the different salts diffusing up, with unequal velocity, into the sheet of fresh water, with which the lake is periodically covered during the wet season.

It was further shown that chemical decompositions may be produced by liquid diffusion. The constituents of a double salt of so much stability as common alum being separated; and the sulphate of potash diffusing in the largest proportion. In fact, the diffusive force is one of great energy, and quite as capable of breaking up compounds as the unequal volatility of their constituents. Many empirical operations in the chemical arts, it was said, have their foundation in such decompositions.

Again, one salt, such as nitrate of potash, will diffuse into a solution of another salt, such as nitrate of ammonia, as rapidly as into pure water; the salts appearing mutually diffusible, as gases are known to be.

Lastly, the diffusibilities of the salts into water, like those of the gases into air, appear to be connected by simple numerical relations. These relations are best observed when dilute solutions of the salts are diffused from the solution cell, such as 4, 2, or even 1 per cent. of salt. The quantities diffused in the same period of seven days from 4 per cent. solutions of the three salts, carbonate of potash, sulphate of potash, and sulphate of ammonia, were 10.25 grains, 10.57 and 10.51 grains respectively; and a similar approach to equality was observed in the 2, 4, and 6 per cent. solutions of the same salts. It also held at different temperatures. The acetate of potash appeared to coincide in diffusibility with the same group, and so did the ferrocyanide of

potassium. The nitrate of potash, chlorate of potash, nitrate of ammonia, chloride of potassium, and chloride of ammonium formed another equi-diffusive group. The times in which an equal amount of diffusion took place in these two groups appeared to be as 1 for the second to 1.4142 for the first, or as 1 to the square root of 2. Now, in gases, the *squares of the times* of equal diffusion are the *densities of the gases*. The relation between the sulphate of potash and nitrate of potash groups would therefore fall to be referred to the diffusion molecule and diffusion vapor of the first group having a density represented by 2, while that of the second group is represented by 1. These were named the *solution densities* of the salts in question. The corresponding salts of soda appeared to fall into a nitrate and sulphate group also, which have the same relation to each other as the potash salts. The relation of the salts of potash to those of soda in times of equal diffusibility appeared to be as the square root of 2 to the square root of 3; which gives to them solution densities of 2 and 3. Hydrate of potash and sulphate of magnesia were less fully examined; but the first presented sensibly double the diffusibility of sulphate of potash, and four times the diffusibility of the sulphate of magnesia. If these times are all squared, the following remarkable ratios are obtained for the solution densities of these different salts, each of which is the type of a class of salts: hydrate of potash 1, nitrate of potash 2, sulphate of potash 4, sulphate of magnesia 16, with nitrate of soda 3, and sulphate of soda 6. In conclusion, it was observed that it is the diffusion molecules of the salts, having such densities, which are concerned in solubility; and not the Daltonian atoms or equivalents of chemical combination; and the application was indicated of a knowledge of the diffusibilities of different substances to the study of endosmose, in which the proper function of the membrane would be distinguished from that of the salt.—*Pharm. Jour.* Feb. 1850.

ART. XLIII.—ON THE VANILLA OF THE ISLAND OF BOURBON.

By M. BOUCHARDAT.

The greater portion of the vanilla we receive comes from the maritime countries of Mexico ; it also grows on the banks of creeks shaded by the mangoes, which are sometimes under water at high tide ; also in Colombia, and in Guiana. Attempts have been made to cultivate it at Cayenne, St. Domingo, and the Isle of France. These efforts have also been followed in the Island of Bourbon. M. Menier has lately received two boxes of vanilla from this colony, and has forwarded a specimen of it to me, which gave rise to the following investigations on the subject.

The *vanilla of the Island of Bourbon* is certainly produced by the same plant as that of Mexico ; the husks present the same general characters ; they are from six to seven inches long, shrivelled, furrowed longitudinally, narrowest at the two extremities, and bent at the base. These husks are rather soft, viscous, of a reddish brown color ; they possess in a considerable degree the characteristic odor of vanilla ; they readily become covered with the white crystalline efflorescence.

The vanilla of Bourbon only differs from that of Mexico in the following unimportant characters ; it is generally less plump, from one-third to two-thirds of an inch shorter, and rather thinner. Its color is redder, and not so brown ; it is drier and less unctuous. Above all, it is distinguished by the characters of the extremities, which dry up and contract, losing that flexibility so characteristic in the Mexican variety. These differences, which are very trifling, suffice to render the vanilla of Bourbon less valuable in a commercial point of view. I am of opinion that these differences arise partially from the mode of preparation or preservation of them ; for instance, in the manner of drying the husks, and in the coating of them with oil. In general

utility the vanilla of Bourbon is scarcely inferior to the best vanillas met with in commerce.

It has been long since stated, that on account of the high price of vanilla, its culture was worthy of attention. I shall presently show that the purposes to which this delightful aromatic may be applied are more important than is generally imagined. But the difficulties in its cultivation seem to be great, for in the different countries it has, as yet, not extended beyond experiments.

M. Morren has, nevertheless, in the greenhouses at Liege, cultivated some vanilla with success. He states that the plants he possesses have yielded vanilla to the value of 600 francs in one year. A single plant, about three yards high, cultivated in the greenhouse of the Museum in Paris, yielded, in 1840, 117 pods of vanilla, having a sweet odor, and ripened in about a twelvemonth.

The following are the principal difficulties relating to the cultivation of vanilla:—1. The proper choice of the species or best variety; 2. The necessity of having an elevated temperature; 3. The determination as to the most favorable conditions for the development of this plant; 4. A good mode of preparing the pods.

The species or variety producing the best commercial vanilla is not yet determined. The *Vanilla aromatica* of Swartz, figured by Plummier, and ascribed by Linnæus to the *Epidendrum vanilla*, does not appear to be the vanilla of commerce. Indeed, Plummier states that his plant, which is from St. Domingo, is without odor, the fruit small, thin, and cylindrical; thus does not resemble the true vanilla. On the other hand, MM. Splitgerber and Morren assert that the long vanilla of commerce is furnished by the *Vanilla planifolia*. That which makes the latter appear to be the most probable opinion is, that the same species, cultivated in the houses of Liege and Paris, *artificially produced by the pollen of another species*, has produced pods equal to those of the best commercial vanilla. Thus

we see it has yet to be determined which is the best species or variety to cultivate.

The cultivation of vanilla in France must, necessarily, be limited, on account of its requiring an elevated temperature, such as that of a greenhouse, which ought to be of a large size and airy. From this cause its cultivation is not likely to be attended with any profitable pecuniary results, unless under peculiar circumstances. The most favorable conditions for the development and fructification of the vanilla are far from being determined. The difficulties attendant on the cultivation of the orchidacea are well known, and that of the vanilla appears to be more so than others of the same family. Its stems are provided with adventitious roots, which implant themselves in the bark of the mangoes, and it is periodically watered by the high tides. Does not the vanilla require this or a similar tree favorable to parasitic growth? And are not the salts of the sea equally favorable to the development of the mangoes, and consequently to the vanilla itself?

In the Island of Bourbon, and in Guiana, the principal requisites we have named may be obtained. I think, therefore, the cultivation of vanilla would be regular and certain, and the increased consumption of it would speedily follow its production.

I will now refer to the question of increased consumption. I perfectly agree in the opinion of MM. Méral et de Lens, who say (*Dictionnaire de Matière Médicale*, t. 6, p. 852,) that "the vanilla, if used in many of our aliments, would give to them an agreeable and delicate flavor, rendering them more serviceable in derangements of the digestive functions." It may also be added that vanilla contains a balsamic oil, possessing the valuable properties (which M. Deschamps has discovered in the poplar and in benzoin,) of counteracting the rancidity in fatty bodies. We may thus easily understand the twofold utility of vanilla in the manufacture of chocolate. In taking into consideration the

delicious flavor of this aromatic, we see to what great extent it might be used in the preparation of fatty aliments, if its price was moderate and certain. The sweetness of its perfume is a great recommendation to its employment by chemists, for the purpose of counteracting the rancidity of pomades.—*Pharmaceutical Journal for December, from Journal de Pharmacie.*

ART. XLIV.—ANALYSIS OF CALIFORNIAN GOLD.

BY F. OSWALD.

This sample obtained from London consisted of small grains weighing respectively 48, 30, 24 and 18 grs., mixed with a fine ferruginous sand containing some iron spangles and a few particles of sulphuret of lead.

The gold itself had a very high color; a fine streak like the finest ducat gold; a dirty dull appearance, arising from brownish-red peroxide of iron, alumina, silica and calcareous sediment, which could be removed partially by digestion in sulphuric acid. The specific gravity of the pure pieces was 17.4. They consisted in 100 parts of —

| | | | |
|-------------------------------|--|-------------------|-------|
| Gold | 87.6 | T. H. Henry found | |
| Silver | 8.7 | Gold | 88.75 |
| <i>Residue consisting of—</i> | | Silver | 8.88 |
| Peroxide of iron | $\left. \begin{array}{l} \left. \begin{array}{l} 1.7 \\ 2.0 \end{array} \right\} 3.7 \end{array} \right\}$ | Copper and iron | 0.85 |
| Alumina | | Siliceous residue | 1.40 |
| Lime | | | |
| Silica | | | |
| Moisture | | | |
| | <hr/> 100.0 | | |

and a small loss.

The alloy of gold and silver which it contains consists consequently of—

T. H. Henry obtained

| | | | |
|--------|--------|--------|-------|
| Gold | 909.66 | Gold | 90.01 |
| Silver | 90.34 | Silver | 9.01 |
| | | Copper | 0.86 |

and corresponds to an alloy of 21.48 carats. On comparing the author's analysis with that of Henry, it is evident that the Californian gold does not occur everywhere alike as regards the amount of silver; and that the accompanying constituents are not in all cases the same, but vary either with the nature of the soil, or with the greater or less care employed in the washing.—*Chemical Gazette*, January 15, 1850, from *Poggendorff's Annalen*, lxxviii. p. 96.

ART XLV.—ON THE SEPARATION OF SOME ACIDS OF THE SERIES (CH)ⁿO⁴.

BY PROF. J. LIEBIG.

In order to discover small quantities of butyric and valerianic acids in an acid mixture of the two, and to obtain the acids in a fit state for analysis, the following plan is most advantageous:—

A portion of the acid mixture is saturated with potash or soda, the remaining portion of the acid is added to the neutralized portion, and the whole subjected to distillation. Two cases now occur; if the valerianic acid in the mixture amount to more than is sufficient to neutralize the whole of the alkali, the residue contains no butyric acid, but pure valerianic acid. If the quantity of valerianic acid be less, a proportionate amount of butyric acid is left with the whole of the valerianic acid in the residue, but the distillate consists of pure butyric acid.

The quantity of the mixed acids which is neutralized

with alkali must be measured by the amount of the valerianic acid supposed to exist in the mixture; for instance, assuming 10 per cent. of valerianic acid, then one-tenth of the mixture is neutralized; but supposing it to be a valerianic acid containing 10 per cent. of butyric acid which it is wished to separate, then nine-tenths of the acid must be neutralized.

It is readily perceived that by a single operation one of the acids is always obtained pure. Either the distillate is pure butyric acid, and then the residue consists of a mixture of valerianic and butyric acids, or the distillate contains butyric and valerianic acids at the same time, and in this case the residue contains pure valerianic acid. By continuing the same treatment of the mixed residue or of the mixed distillate, *i. e.* partial saturation and distillation, it is possible to obtain from the residue another portion of one or other of the acids pure; and finally a perfect separation is effected, such as is scarcely possible by mere distillation of the acids.

As the boiling points of these two acids differ, it will be imagined that the soda, on combining with the least volatile of the acids, in this case the valerianic, deprives it of its volatility at the temperature at which the other boils. When, in a mixture of valerianic and butyric acids, the latter can naturally be distilled off in a pure state.

A mixture of valerianic with acetic acid, or of butyric with acetic acid, behaves in a totally different manner under the same circumstances. When such a mixture is partially neutralized with potash, and then submitted to distillation, it would be expected that acetic acid would principally pass over; such however is not the case, but the two other acids distil over, although the boiling point of acetic acid is more than 90° lower than that of butyric acid, and more than 126° lower than that of valerianic acid. This is owing to the formation of an acid acetate, which does not appear to be decomposed by either of the other two acids.

If valerianic acid is added to a solution of neutral acetate of potash, it instantly dissolves and in large quantity; in binacetate of potash the valerianic acid floats in oily drops upon the surface, and appears not to dissolve therein to a greater extent than in water. If a solution of neutral acetate of potash, to which an excess of valerianic acid has been added, is submitted to distillation, valerianic acid passes over, and the residue contains binacetate of potash together with valerianate of potash. If valerianic acid is added to binacetate of potash and the mixture distilled, valerianic acid passes over, and the binacetate is left in the retort free from valerianic acid. Butyric acid behaves precisely like valerianic acid. When therefore butyric or valerianic acid containing acetic acid is partially saturated with potash and distilled, either the whole of the acetic acid is left as an acid salt together with butyric acid, and in this case the acid which passes over is pure and free from acetic acid; or only acetic acid is left in the residue, and in this case the distillate still contains acetic acid, which can be separated from the butyric or valerianic acid by a similar operation.—*Chem. Gaz.*, January 15, 1850, from *Liebig's Annalen*, Sept. 1849.

ART. XLVI.—ON THE OCCURRENCE OF FORMIC ACID IN STINGING NETTLES.

BY DR. GORUP-BESANEZ.

Some time ago, F. Will showed, by microchemical and microscopical experiments, that the fluid in the hairs of the so-called procession-caterpillar (*Bombyx processionaria*), which causes an inflammation of the skin, as well as the liquid in the poisonous organs of some insects, is nothing else than formic acid. It became highly probable therefore that formic acid would also occur in the vegetable kingdom already formed; and the first class of plants which was

thought of was that which, by means of stinging hairs or similar organs, produces an analogous effect to the sting of certain insects.

About a pound of the collected plants, *Urtica urens* and *dioica*, was cut small and pressed, and submitted to distillation with about four times the quantity of water and a few drops of concentrated sulphuric acid. The distillate was opalescent; a few oil-drops floated on its surface; it had a very offensive odor and a scarcely perceptible acid reaction. Mixed with carbonate of soda and evaporated to dryness in the water bath, it furnished a brownish mass, a very small portion of which was deliquescent, the greater consisting of the excess of carbonate of soda.

The mass was now very cautiously decomposed in a glass retort by the gradual addition of dilute sulphuric acid, when a distinctly acid distillate was obtained in the well-cooled receiver, which, neutralized with ammonia, gave all the reactions characteristic of formic acid. This experiment however did not appear to me to furnish a satisfactory proof of the presence of ready formed formic acid in the plant, as formic acid can be *produced* from the most different organic substances by concentrated sulphuric acid; and it was possible that in the present case the formic acid might have been produced by decomposition towards the end of the operation.

Five pounds of stinging nettles were therefore distilled with a corresponding quantity of water without any addition of sulphuric acid, and a product obtained perfectly similar to the one above mentioned. It was neutralized with carbonate of soda, evaporated to dryness, the residue decomposed with dilute sulphuric acid, and the acid distillate digested with carbonate of lime, in order to avoid the excess of carbonic acid and excess of alkali, which rendered the reactions very indistinct, and filtered. The yellowish solution, concentrated in the water-bath, proved to be formiate of lime. It reduced salts of silver and mercury, gave

with sulphuric acid the characteristic odor of formic acid, and with sulphuric acid and alcohol the still more characteristic smell of formic ether; oxalate of ammonia showed the presence of lime.

The amount of formic acid present in stinging nettles is certainly small; but this will not appear surprising, if we suppose that this acid is contained only in the stinging hairs, an assumption which is confirmed by the microscopic observations of Will and Lucus. When, for instance, solution of silver is added to the plant under the microscope, and a gentle heat applied, reduction always first occurs at the extremity of the stinging hair. *Chemical Gazette*, January 1, 1850, from *Journ. für Prakt. Chem.*, xlviii. p. 191.

ART. XLVII.—CONCENTRATED TINCTURE OF CAPSICUM, A
REMEDY FOR CHILBLAINS AND TOOTHACHE.

BY A. TURNBULL, M. D.

At this season few diseases are so general as chilblains, and the plans that are generally employed for their removal are seldom attended with more than very slight advantage to the sufferers.

It is a disease that attacks most generally females and delicate children, and those of a languid circulation. The very numerous and various medicines which have been from time to time employed, prove very clearly that no very effective or successful plan of treatment has hitherto been found. Such is the present state of treatment both of chilblains and toothache.

My plan of treatment is simply to saturate a piece of sponge or flannel with the concentrated tincture of capsicum, and to rub well over the seat of the chilblains until such time as a strong tingling or electrical feeling is produced. This medicine possesses an extraordinary power in

removing congestion by its action upon the nerves and circulation.

This application ought to be continued daily until the disease is removed; relief will be experienced on the very first application, and frequently there will be a total removal of the disease after the second or third. This of course depends upon the severity of the case. This embrocation when rubbed, never produces excoriation if the skin is not broken.

The manner of using it for toothache, is by putting a drop or two of the tincture on cotton, and applying it to the part affected—the relief will be immediate. The following is the formula:—

Tinctura Capsici Concentrata.

R Capsici Baccarum, ℥iv.

Spiritus Vini Rect., ℥xij.

Macera per dies septem et cola.

It may also be made with advantage by displacement.

[The fluid oleo resinous extract obtained by acting on capsicum with ether, and evaporating the ether, must possess yet stronger claims as a remedy in toothache, inasmuch as it is much stronger than capsicum weight for weight.—ED. AM. JOUR. PHARM.]

ABSTRACT FROM THE MINUTES OF THE PHILADELPHIA COLLEGE OF PHARMACY.

At a Stated Meeting of the Philadelphia College of Pharmacy, held at their Hall, Third month 25th, 1850.

The Minutes of the last Stated and Adjourned Meetings were read and adopted.

The Minutes of the Board of Trustees were read by the Secretary. Since last meeting, the Degree of Graduate in Pharmacy has been conferred upon the following gentlemen, who have served a regular apprenticeship, attended two full courses of lectures, and passed a satisfactory examination before the Professors and Committee of the Trustees, viz:

| | |
|--------------------|---|
| Samuel C. Bunting, | Thesis on Kernels of <i>Amygdalus Persica</i> . |
| Joseph Laidley, | " Pharmaceutical Preparations. |
| Samuel E. Shinn, | " Glycerin. |
| Charles S. Rand. | " { The relative positions of the Medical and Pharmaceutical professions. |
| Benjamin B. Davis, | " Tannic Acid. |
| Horace Conté, | " The Cultivation of Coffee. |
| Isaac C. Jones, | " { The Pharmaceutical Treat- ment of <i>Cinchona</i> Barks. |

The Committee appointed on the Adulteration of Drugs, in Third month, 1848, not being prepared to make a final report, are further continued.

The proposal to alter Section 4th of Law 5th, was again brought into view by reading the Report of the Committee, and on motion, the alteration was adopted as follows:

Law 5th Section 4th.

"Professional or scientific men residing at a distance from Philadelphia, may be elected Associate Members by the Board of Trustees, provided they are graduates of a respectable College of Pharmacy. Those who are not graduates in Pharmacy, if recommended by the Board as suitable candidates, may be elected Associate members by the College at any of its Meetings, by the unanimous vote of the members present. Each member so elected, to pay a contribution of twenty dollars, in lieu of all other contributions.

The Special Committee appointed at the last Meeting, on the Revision of the Pharmacopœia, &c., made a report which, on motion, was adopted and referred to the Committee on the Pharmacopœia, with instructions to report at the next meeting.

The Report of the Publishing Committee was read and accepted. In consideration of the valuable collection of facts contained in the pages of the Journal, the Committee have determined to publish a general Index, by which immediate reference may be had to any part of the twenty-one volumes which have already been published. This work will embrace about sixty pages double column, and will be issued in three

parts, with the three forthcoming numbers of the current volume, and will be distributed to subscribers gratuitously. The Committee believe it due to those who have long taken the work, while its presentation to the more recent patrons will, by exhibiting the interesting and useful character of the preceding volumes, induce them to complete their sets.

During the past year, the Committee have expended in publishing and editing the Journal, seven hundred and ninety dollars and twenty-eight cents, and received from collections, including balance on hand at last report, eleven hundred and ninety-six dollars and fifty-five cents, leaving a balance in favor of the Publishing Committee of four hundred and six dollars and twenty-seven cents.

The Committee on Latin Labels report that since their appointment they have published and sold four editions of said Labels. A fifth edition of 1500 copies, including a complete set of Labels for Specimens of the *Materia Medica*, and 500 of copies specimen labels with the symbols, printed separately, has recently been published, and is now in course of sale. The profit arising from the sale of the labels has been used by direction of the College.

On motion it was Resolved, That the thanks of the College are eminently due to the Committee for their faithful discharge of the onerous duties which have been imposed upon them during the past fifteen years.

The Committee on the Sinking Fund report that they have been engaged in their duties during the past year, and have purchased two shares of Loan for one hundred and fifty dollars.

The committee on the Cabinet of Specimens report that they have had the necessary cases prepared and placed in the library ready for the specimens. That a part of the glassware has been procured and put in the cases, the balance having been ordered from the manufacturer, and may soon be expected. The committee propose to employ the labels, recently published by the committee on Latin labels, to designate the specimens

and they believe by the next meeting of the College they will be prepared to offer their final report. A number of the members of the college have agreed to contribute to the collection, from their stock, and there is every reason to suppose that the cabinet can be mainly filled without expense to the institution. When the receptacles shall be ready and the collection fairly under way, the committee would suggest that such a notice be given of it in our Journal as will inform the members and associates of the College of its existence, and invite contributions from these and others, of all rare, interesting and curious specimens in any way connected with Pharmacy. The committee believe that this cabinet may be the nucleus of a Pharmaceutical *Museum*, embracing natural specimens from the vegetable and mineral kingdoms, which with a fostering care from the College, through a suitable standing committee, will become respectable in its extent and exceedingly valuable as a depository to the Pharmaceutical student."

The Secretary introduced a letter which he had received from Dr. Caspar W. Pennock, of Delaware County, in which he informs that the "Scalpel," a medical Journal in New York, has advertised the public "that an agreement exists between the druggists and most of the physicians of Philadelphia, by which a percentage of the profits arising from compounding medical prescriptions is paid by the apothecaries to the physicians sending them said prescriptions," and that this statement had been republished in one or more of the public papers.

The communication elicited an indignant denial on the part of the members present of any participation in such arrangement, or of any positive knowledge of its existence. But as it was believed the Code of Ethics adopted by this College, which has been extensively published and circulated, was a sufficient answer to such a charge, it was concluded that further action on the subject at this time was unnecessary.

Joseph C. Turnpenny offered his resignation as Treasurer of the College, which on motion was accepted.

On motion, it was unanimously Resolved, that the thanks of

the College are due to our late Treasurer for the able manner in which he has discharged his duties for a period of ten years.

The College then proceeded to the annual election. The chairman appointed Thos. P. James and Charles Bullock, tellers who reported that the following members had received a majority of votes for the respective offices, and they were accordingly declared duly elected.

President,

Daniel B. Smith.

1st Vice President,

Charles Ellis.

2d Vice President,

Samuel F. Troth.

Secretary,

Dillwyn Parrish.

Treasurer,

Ambrose Smith,

Corresponding Secretary,

Joseph C. Turnpenny.

Trustees,

Warder Morris,

William Procter, Jr.,

Dr. Joseph Carson,

Dr. Robert Bridges,

John H. Ecky,

Edward Parrish,

William P. Troth.

Daniel S. Jones.

Publishing Committee,

Dr. Robert Bridges,

Edward Parrish,

Charles Ellis,

Alfred B. Taylor.

Committee on Sinking Fund,

Warder Morris.

Samuel F. Troth,

Joseph C. Turnpenny.

The former Treasurer is directed to hand over the books, and funds belonging to the College to Ambrose Smith, his successor in office.

Then on motion, adjourned.

DILLWYN PARRISH, Secretary.

Editorial Department.

By reference to the minutes at page 187, it will be observed that the attention of the College has been directed to a charge which appeared in a medical periodical, published in New York, called "The Scalpel," to the effect "that an *agreement exists between the druggists and most of the physicians* of Philadelphia, by which a per centage of the profits arising from compounding medical prescriptions is paid by the apothecaries to the physicians sending them said prescriptions."

What motive could have induced the writer of the above paragraph to cast so foul and sweeping an aspersion on the character of the physicians and pharmacutists of this city, we cannot divine; but that it is most unjust, and in the main untrue, we have no hesitation in asserting. That a few isolated instances exist here, as perhaps in all large cities and towns, where one or more physicians have an interest in a store, or who seek to add to their incomes by receiving a per centage on prescriptions directed to a particular store, may be true; but on examining into these cases, the professional standing of the parties has not been of a character to implicate either profession; indeed, we know of no city where so distinct a line of separation exists between the practitioners of medicine and pharmacy; in evidence of which it may be stated that the Philadelphia College of Physicians have, by resolution, declared that "any connection with, or monied interest in apothecaries stores on the part of physicians should be discountenanced;" and the Philadelphia College of Pharmacy have in like manner declared in their published *Code of Ethics*, "That an apothecary being engaged in furthering the interests of any particular physician to the prejudice of other reputable members of the medical profession, or allowing any physician a per centage or commission on his prescriptions, is unjust towards that profession, and injurious to the public."

We have no desire to attribute bad motives to the author of the aspersion in "the Scalpel," and are willing to place it to the account of wrong information; but we do decidedly object to the publication of such wholesale accusations, without any evidence of pains having been taken to ascertain their truth.

Whilst on this subject, we would express our utter disapprobation of the practice alluded to. A physician who asks an apothecary to give him a per centage, virtually asks him to overcharge his patients. It

does not end here: as he finds his income increased from this new source, it becomes a direct inducement to prescribe oftener, in larger quantities, and in more expensive forms; for we do not hesitate to believe, that any medical man who will so far wound his self respect as to propose such a source of revenue, will find no scruples beset him against the practice of over medication. On the other hand, an apothecary who will enter into such an agreement, must seek some means of compensation for the per centage paid to the physician, and the most natural source of this is a resort to over-charging his customers, either directly by increase of his usual price, or indirectly by an understanding with the prescriber as to the form of the prescription; increasing the doses or bulk without materially adding to the cost of the medicines.

We will take advantage of this occasion to allude to some abuses which *do* exist to a certain extent amongst us, and which are chiefly attributable to the over burthened ranks of both professions. Of the large number of medical graduates who annually derive their authority to practice from the flourishing medical institutions of this city, a fair proportion belong to Philadelphia, or conclude to remain here, and unfortunately their ratio of increase is greater than that of the population. We all know of the drawbacks and discouragements incident to establishing a medical practice. A number of young physicians, in the hope of surmounting the pecuniary difficulties which mark the commencement of their career, have opened drug stores, and conducted them either by the assistance of apothecaries, or with the slender stock of pharmaceutical knowledge acquired during the course of their medical education. At such stores medical advice is administered gratis, as an inducement to a certain class of customers who aim at avoiding the fee of the physician. This species of *counter practice* induces a similar one on the part of some apothecaries, from competition or necessity, and is one of the means of destroying the well defined line of separation.

Another serious feature in the existing state of Pharmacy, is the large number of badly qualified assistants. Some of these, with but a tithe of the requisite knowledge, open petty stores, and in order to get business, undersell their neighbors, until assurance gives them pecuniary success, or till they cease from inability to meet their engagements. The chief source of this class of apothecaries will be found in a deficient pharmaceutical education. Boys go to the business—stay one or two years, perhaps under unfavorable circumstances—become disgusted and leave their apprenticeship, to hire for a small salary, at places where they will hardly add materially to their stock of knowledge. Many of this class would have become useful and respectable members of the community, if they had been placed at a busines

better suited to their qualifications and inclination. Indeed, so important are a certain natural ability and a fair education to the professional success of the pharmacist, that it cannot be too strongly urged on those who take apprentices, to feel assured, as far as it is in their power, not only of their fitness for the business in the ordinary prerequisites, but that they have a knowledge of the onerousness of the task they assume, and are prepared with steady determination and perseverance to master the innumerable petty annoyances and difficulties which must inevitably attend their onward course. In fact, a certain degree of enthusiasm is needed by a boy in his passage through the first stage of his pupilage in a thorough establishment, without it causing disgust and dislike; and to compel years of labor from such as are not buoyed up by the hope of ultimate honorable success as pharmacutists, is almost cruel.

GUTTA PERCHA.—One of the happiest applications of this remarkable substance that we have met with, is in the shape of bottles for hydrofluoric acid. It is well known that the leaden bottles usually employed to hold this substance are frequently imperfect, and their contents lost. The gutta percha bottles are not only intact by the acid, but can be hermetically sealed by the same material, and their contents rendered perfectly secure. These bottles may be put to numerous purposes, and perhaps to none more valuable than as receptacles for liquids in medicine chests, especially those exposed to land carriage. We have seen funnels of the same material; and doubtless syphons, and various tube connections in pneumatic apparatus, may be formed from the same substance, which will offer a very valuable substitute for the usual glass implements.

WHALEBONE SPATULAS.—Mr. T. H. Tustin, in the *Pharmaceutical Journal*, suggests the employment of whalebone spatulas as a substitute for those of horn, which, he says, are to be decidedly superior to the latter, being more elastic and tougher.

A Universal Formulary: containing the methods of preparing and administering officinal and other medicines. The whole adapted to Physicians and Pharmacutists. By R. EGLESFELD GRIFFITH, M. D. Philadelphia. Lea & Blanchard: 1850. pp. 567. Octavo.

We know of no one better qualified for the task of preparing "a universal formulary" than Dr. Griffith, and he appears to have brought to the task the accumulated experience acquired during many years application as a medical writer and editor. The "Formulary" proper embraces a very large collection of recipes, besides those which are

official. The arrangement is alphabetical in relation to the drugs, all the simple preparations of each drug being arranged under its name, and in compound preparations under the head of the most important ingredient. This is decidedly the most eligible way of presenting the subjects. In addition to the formulary, many valuable tables are appended and general pharmaceutical directions, both as to manipulation and the classes of preparations. The index of diseases and their remedies will be found exceedingly useful in the selection of formulæ for particular diseases, by young practitioners and by others who consult the work with the same view. On the whole, we view this work of Dr. Griffith as a valuable acquisition to the medical practitioner, and as affording a useful book of reference to the apothecary on numerous occasions.

The American Medical Formulary: Based upon the United States and British Pharmacopœias. Including numerous standard formulæ derived from American and European authorities. Together with the medical properties and uses of medicines, poisons, their antidotes, tests, etc., designed for the medical and pharmaceutical student. By JOHN J. REESE, M. D., &c. Philadelphia. Lindsay & Blakiston: 1850. pp. 357.

We received the book of Dr. Reese too late to give it a close examination. It is more concise than the preceding, but embraces a variety of formulæ besides those official in the British and American Pharmacopœias. It contains a chapter on tests, another on dietetic preparations, a posological table, and as a whole is calculated to be useful to the physician as a book of reference.